GAS JOURNAL

LIGHT . HEAT . POWER . BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. 202. 85th Year. LONDON, APRIL 26, 1933. No. 3649. Price 1s.

THE NEW "500"

Foochow

Oriental Lacquer

100° MORE HEAT RESISTANCE

ENABLES YOU TO RENOVATE YOUR OLD BLACK COOKERS FOR SIMPLE HIRE IN SUPERB FINISHES WITHOUT FEAR OF DISCOLORATION

For Gas Cookers, Fires, Radiators, Geysers, etc.

THE THREE LATEST AND MOST POPULAR "FOOCHOW" FINISHES ARE

MEERSCHAUM ARMOUR PLATE SHAMROCK

Let us treat a Cooker in any one of these finishes for your inspection and test. "FOOCHOW" ORIENTAL LACQUER has solved the problem of giving your cookers on simple hire the same attractiveness and your consumers the same satisfaction as the most expensively finished cookers. Write without delay.

DONALD MACPHERSON & CO., LTD.,
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PATENT RETORTS, LIMITED

Suppliers of

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for Treating Coal and Oil Shale

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LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in progress for early delivery.

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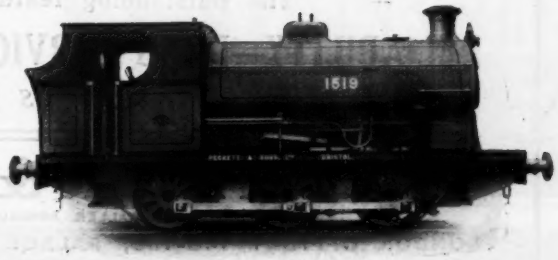
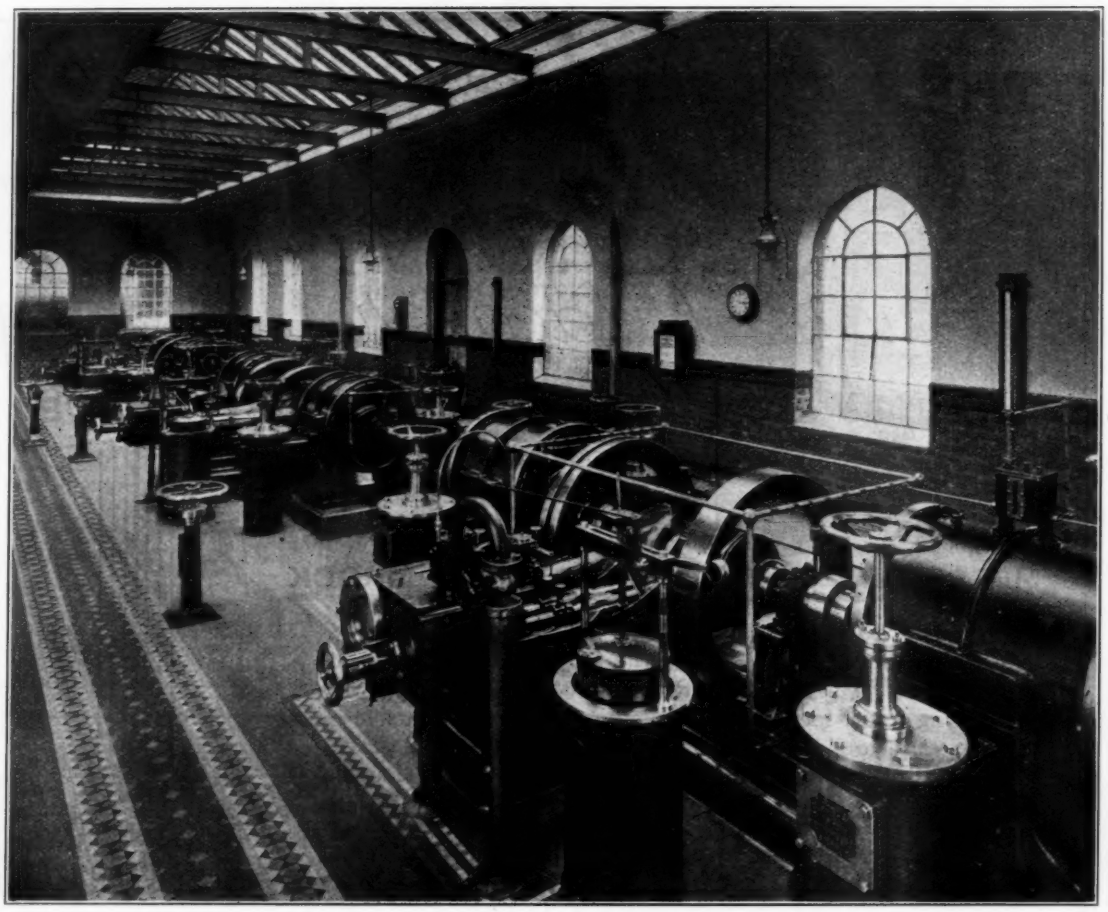


EXHAUSTERS

Waller's 3 and 4 Blade Type



Six Waller 4-Blade Exhausters at a London Gas Works.

WALLER'S 4-BLADE EXHAUSTERS (Patented by George Waller in 1889) have gained a premier position with Gas Engineers throughout the World.

Since our patents have expired, other makers have offered this type, but our long experience and special plant ensure a more perfect machine.

Small Space occupied.
Low peripheral speed.
Very steady gauge maintained.
No gears to get noisy.
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COMPLETE RANGE OF SIZES FROM 500 TO 500,000 CU. FT. PER HOUR

The outstanding features of all our products are :—

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AGENTS FOR SCOTLAND · MESSRS. MILNE & MITCHELL, 75, BATH STREET, GLASGOW C.2.

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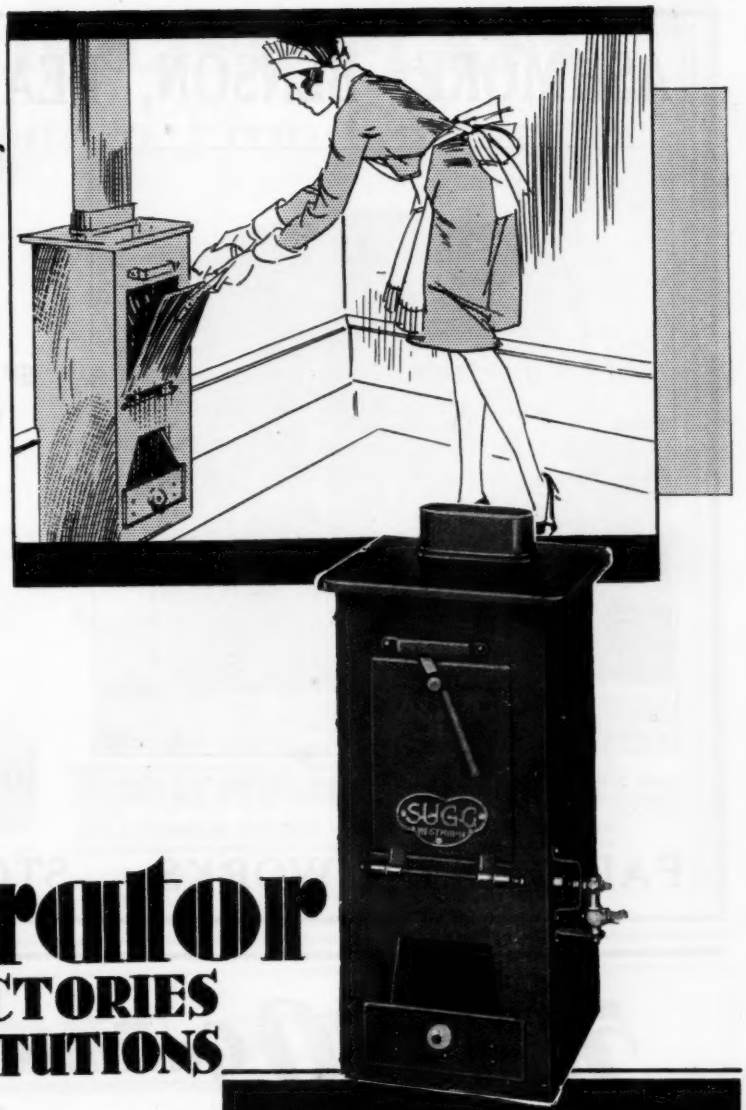

The
Gas Incinerator
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Write for folder giving full details of the three models available.

Illustration shows Incinerator No. 3696, a strong and serviceable model at a very attractive price.

Wm. SUGG & CO. LTD

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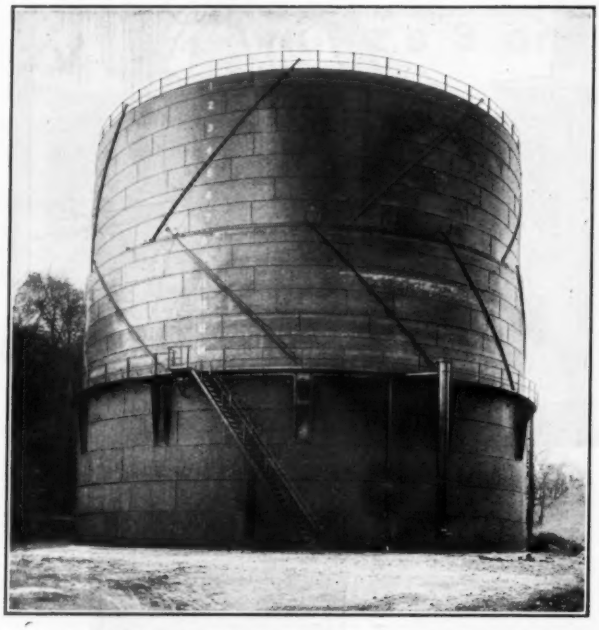

2-Lift Spiral-Guided Gasholder. 250,000 c.ft. cap. with Steel Tank at Chester-le-Street for THE NEWCASTLE-UPON-TYNE & GATESHEAD GAS CO.
(*Frank P. Tarratt Esq., M.Inst.G.E., M.Inst.Gas E., Engineer.*)

MAKERS OF

GASHOLDERS

OF ALL SIZES

SPIRAL: STANDARD GUIDED:
WATERLESS (Klonne Patent)

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PURIFIERS

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WATER-GAS PLANT

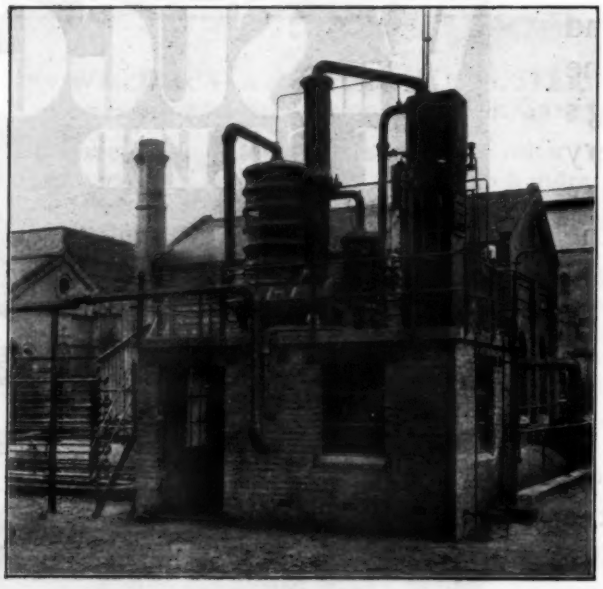
PRODUCER GAS PLANT

PARKFIELD WORKS, STOCKTON-ON-TEES

50,000 Gallons of BENZOLE

produced daily by

SIMON-CARVES BENZOLE PLANTS



Simon-Carves Benzole Plant at North Shields for the Newcastle-upon-Tyne and Gateshead Gas Co., recovering 275 gallons per day of 90% Benzole at 120° C.

Main steam and water feeds on Simon-Carves Benzole plants are thermostatically controlled, thus only occasional attendance is required on the plant.

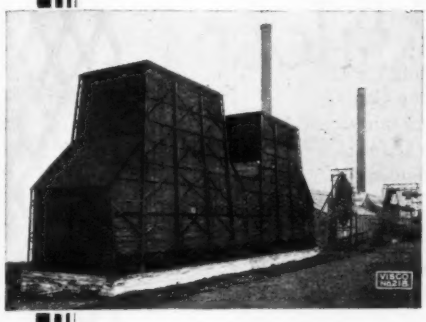
Over 30 years' experience in the construction and operation of benzole plants ensures dependable and satisfactory operation.

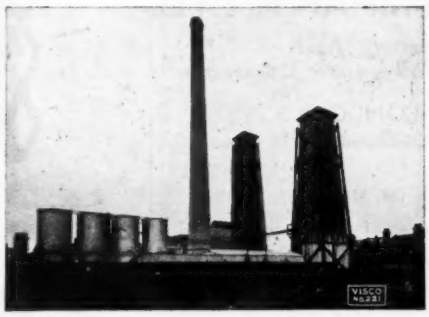
Write to us for full particulars. Our expert advice is at your service.

SIMON-CARVES LTD

CHEADLE HEATH, STOCKPORT

WATER COOLING PLANT
with a Firm Guarantee





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Ask for booklet "Visco Cooling Towers."

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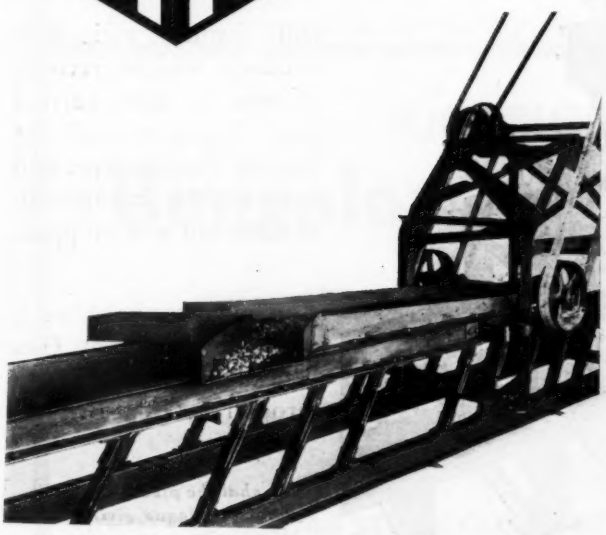

"H.H." COKE SCREEN AT WOLVERHAMPTON GAS WORKS.

THE ONLY LOGICAL WAY IN WHICH TO SCREEN COKE IS TO SEPARATE THE LARGER SIZES FIRST AND TO ELIMINATE THE BREEZE LAST OF ALL. This is the method we adopt in the "H.H." Coke Screen, which is characterised by very high screening efficiency, over 95% being obtained in actual practice. The power consumption of this screen is much lower than that required for rotary screens, while the machine acts also as a conveyor, thus facilitating distribution of the graded products into bunkers. ***The only moving part is the shaft carrying the two unbalanced pulleys which actuate the screen,*** there being no cams, rockers, or other complicated parts to get out of order. These screens are built in lengths up to 25 ft., two or more screens being arranged in series where greater lengths are to be covered. Each screen is designed to suit the particular number of grades and the distribution required.

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"EXPAMET" and EXPERIENCE for THE GAS INDUSTRY

"EXPAMET" Expanded Steel has been in ever-increasing use for more than 40 years. It has become invaluable to the Gas Industry, chiefly as reinforcement for concrete, brickwork, and plasterwork; but it has been applied successfully also for Open-work Flooring and Partitions, Gas Purifier Grids, Coke Screens, Window Guards, and for many other purposes.

There is real value in the practical experience acquired during so many years' trading; and it is always at the disposal of those who care to take advantage of it.

THE EXPANDED METAL COMPANY, LTD.

Patentees and Manufacturers of Expanded Metal
Engineers for all forms of Reinforced Concrete and Fire-resistant Construction

BURWOOD HOUSE, CAXTON STREET, LONDON, S.W.1
Works: West Hartlepool. Established over 40 years.

SIZES OF MESHES:

All titles for sizes of meshes are based on the measurement of the shortway of the diamond. "Expamet" of various weights is manufactured in mesh sizes—
6", 3", 2", 1½", 1", ¾", ½", ⅜", ¼", 3/16", ⅛"

"EXPAMET" EXPANDED METAL
BRITISH STEEL
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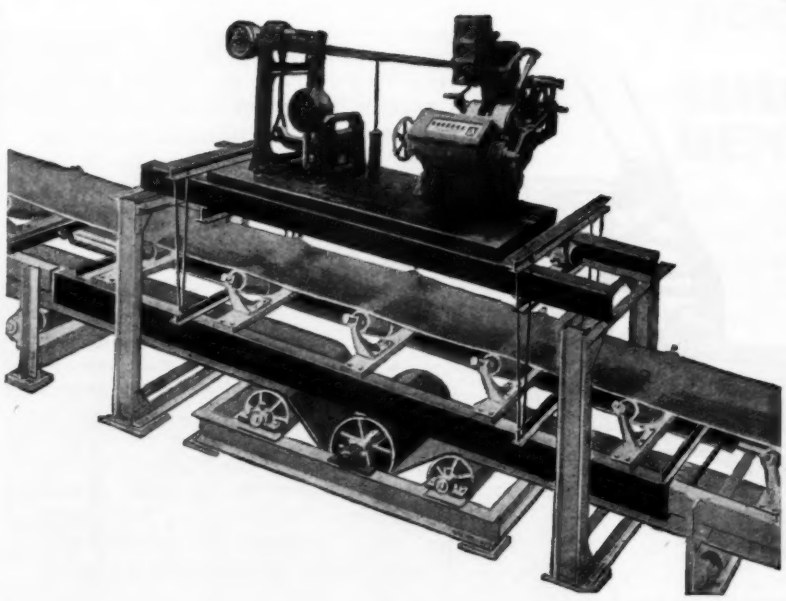
THE "BLAKE-DENISON" AUTOMATIC CONTINUOUS WEIGHER AND RECORDER



will furnish you with accurate weight records of coal or coke carried over Conveyors of the Belt or Bucket type, and thus enable leakages to be detected and stopped.

This machine is at work at many important Gas Works and Coke Ovens throughout Great Britain.

We shall be pleased to send you a Catalogue giving full information on request.

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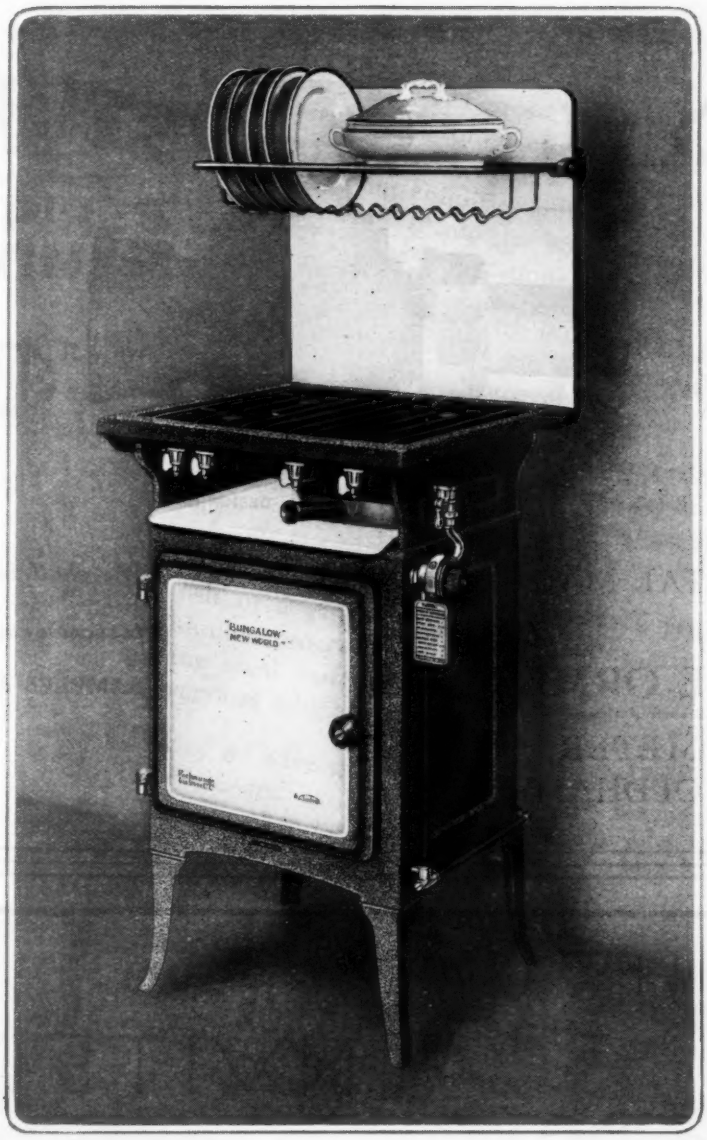
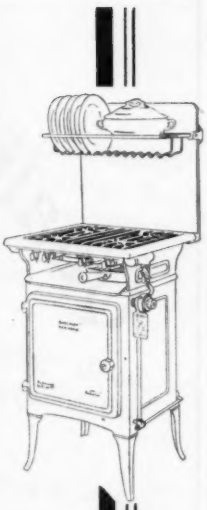
WE ARE ALSO MAKERS OF WEIGHBRIDGES, CRANE WEIGHERS, TESTING MACHINES, &c.





RICHMONDS

"Bungalow" "New World"

COOKERS

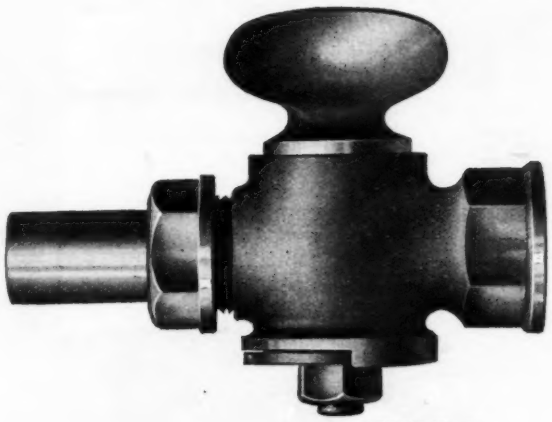
A New Series of Four Sizes with exceptionally wide oven accommodation

These new Cookers (which are raised on high legs) embody all the special Radiation features including the single-oven-burner; direct bottom-flue-outlet; "Regulo" oven-heat control; "Rado" burners; "Vertico" taps; embossed door panel; hexagonal door knob; covered hinges, etc.

RICHMONDS GAS STOVE COMPANY LTD., Warrington & London

Radiation

Quality



DESIGN No. 50

GUN-METAL MAIN COCKS

GEORGE ORME & CO.
(Branch of Meters Ltd.)
ATLAS METER WORKS
OLDHAM

We shall be pleased to receive enquiries for
SAMPLES & PRICES

ENQUIRIES INVITED FOR

Anglo's GAS OIL

ANGLO-AMERICAN OIL CO. LTD.
36 QUEEN ANNE'S GATE-WESTMINSTER - LONDON - S.W.I.
D.A.128.

"EVERITE"
REGD. TRADE MARK
Asbestos-Cement
FLUE PIPES
& FITTINGS

ACBP

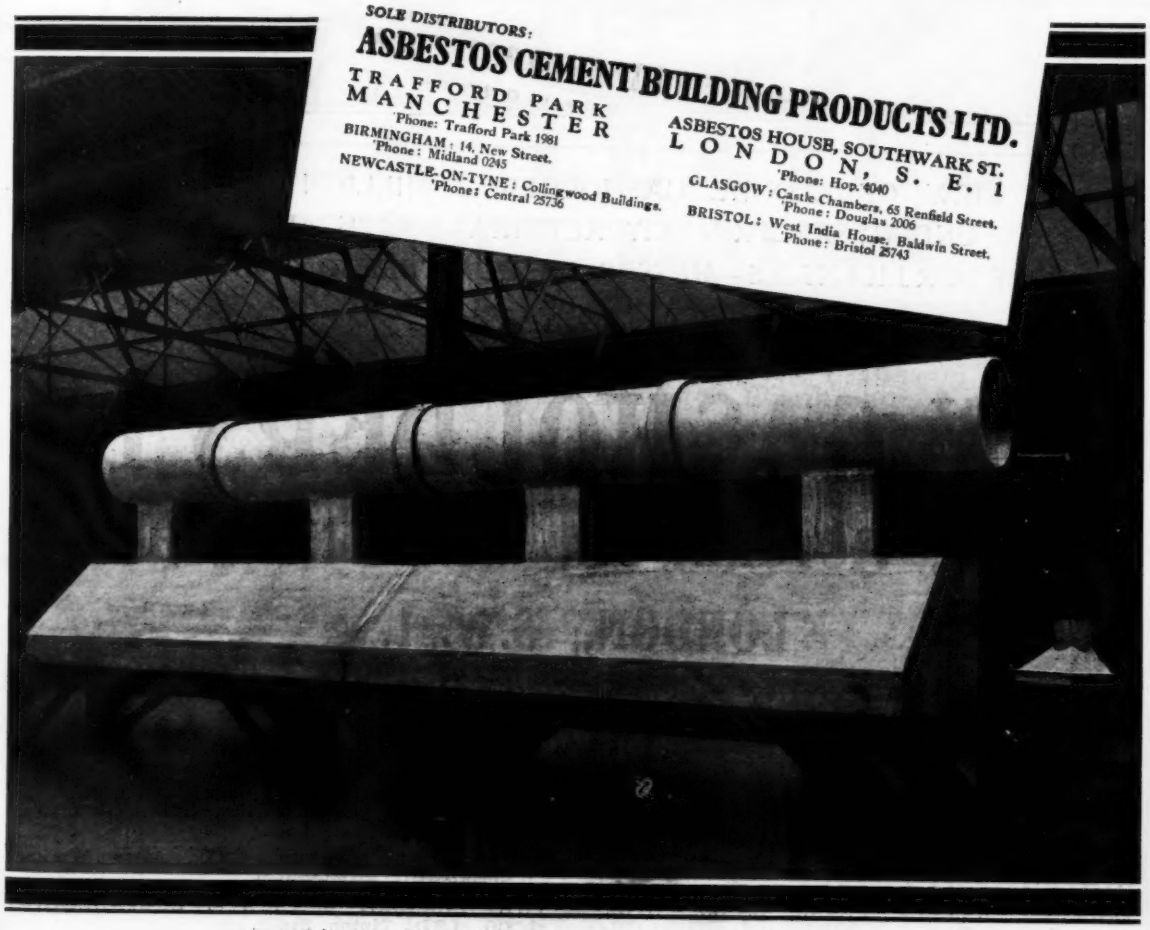
"EVERITE" Asbestos-Cement Flue Pipes and Fittings comprise something more than small fittings for domestic cookers, boilers and geysers. Every day we are receiving enquiries and orders for large pipes and fittings from 6" up to 48" diameter for use with Industrial Gas applications.

The illustration herewith is of an "EVERITE" Hood, 17 feet in length, with 4 rectangular outlets connecting to a run of circular pipe above.

This was supplied against a recent order and is suitable for use over any large-sized gas-fired appliance, to collect the products of combustion, steam or any other fumes resulting from the process involved.

Whether the appliance be a gas-fired range for fried fish or a gas-fired furnace for annealing, forging or similar process, "EVERITE" Hoods and Ducts are the ideal material for the extraction of any fumes or vapours which are unwanted.

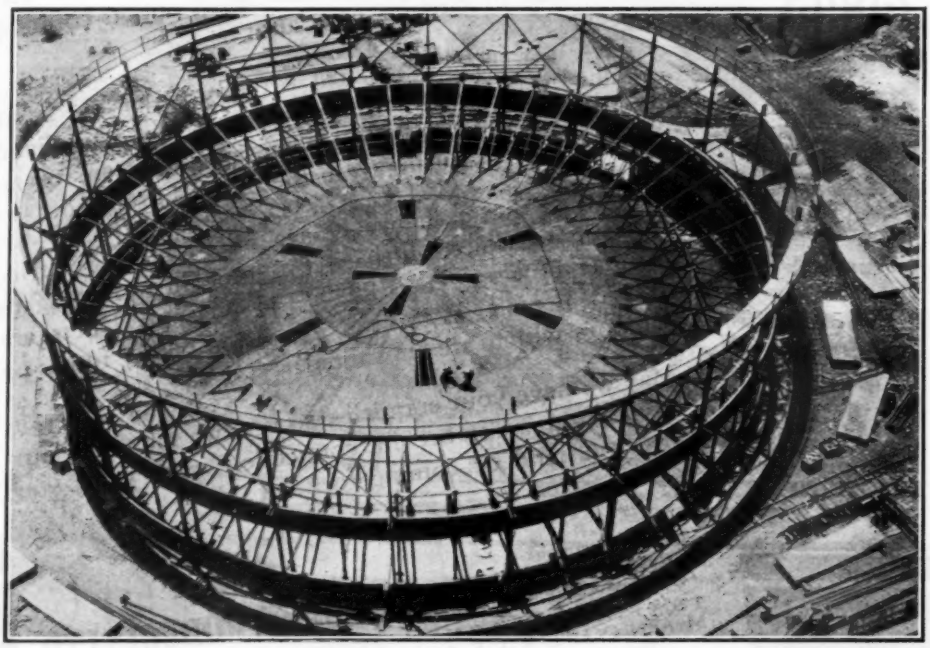
May we have your enquiries so that we may offer our advice and assistance in connection with work you have on hand or coming forward?



℗ D2.

51 WATERLESS (KLONNE) GASHOLDERS

COMPLETED OR UNDER CONSTRUCTION.



AERIAL VIEW OF KLONNE GASHOLDER 2 MILLION C.FT. CAPACITY UNDER ERECTION AT PRETORIA—SOUTH AFRICA.
BY ONE OF OUR LICENSEES—***MESSRS. ASHMORE, BENSON, PEASE, & Co., Ltd.***

DRY GASHOLDERS LTD.

39, VICTORIA ST., WESTMINSTER, LONDON, S.W. 1.

LICENSED MANUFACTURERS:—

SAML. CUTLER & SONS, LTD., 39, Victoria St., Westminster, S.W. 1.

C. & W. WALKER, LTD., Wellington, Salop.

ASHMORE, BENSON, PEASE, & CO., LTD., Stockton-on-Tees.

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THOS. PIGGOTT & CO., LTD., Atlas Works, Spring Hill, Birmingham.

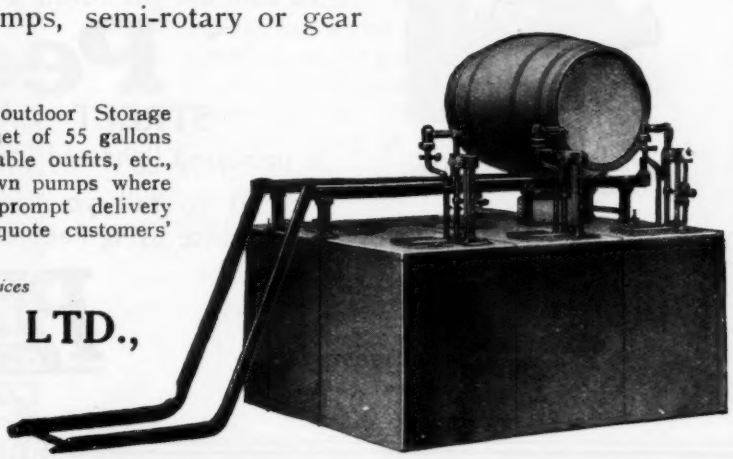
THE HORSELEY BRIDGE & ENGINEERING CO., LTD., Tipton, Staffs.

VALOR
Storage Equipment for Lubricating Oils

THREE 150-gallon tanks fitted with adjustable self-measuring pumps, barrel cradle and dash for indoor storage.

These can also be supplied in 50, 100, 200, 250 and 300 gallon sizes fitted with quart pumps, semi-rotary or gear oil pumps as alternatives.

We are manufacturers of all types of outdoor Storage Equipment, comprising a Sliding-door Cabinet of 55 gallons capacity, barrel covers, drum shelters, portable outfits, etc., fitted with pumps as above or customers' own pumps where desired. We are in a position to give prompt delivery of standard models and are prepared to quote customers' own design and finish where desired.



Write to-day for List 39/V53 and prices

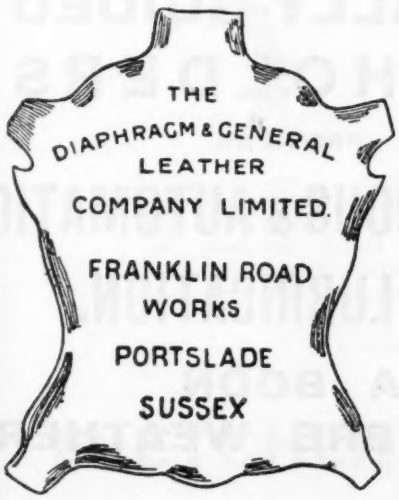
THE VALOR CO., LTD.,

VALOR WORKS, BROMFORD,
ERDINGTON, BIRMINGHAM.
LONDON: 120, Victoria Street, S.W.1.

L.1.

METER LEATHER
GOVERNOR LEATHER

(In the skin or cut to suit customers' requirements)



Oil Dressing for Diaphragms
No. A for Buffed Leather
No. B for Grain Leather

Specially prepared and Guaranteed

Write us for Special Contract Prices and Particulars of our Guarantee
C. M. W. TURNER, Managing Director.

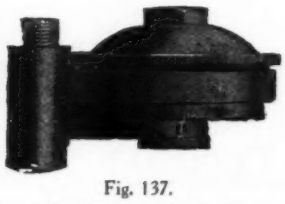


Fig. 137.
With or without Pressure Gauge Connections.
1. Vertical Side Connections (as illustrated).
2. Vertical Inlet, Horizontal Outlet.
3. Vertical Central Connections.
4. Both Connections Horizontal.

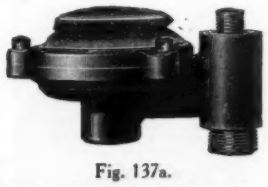


Fig. 137a.
In Fine Cast Iron. Push-on Cap.
(Connections as for Fig. 137.)

Fig 140.
Three of several types.

Aids to Better & Cheaper Street Lighting

Once again the long days are here. Days in which street lamps will come in for overhaul. This will give you the opportunity of fitting Peebles' Street Lamp Governors.

The effect of fitting these tiny governors is to *reduce* the consumption, prevent *waste* due to irregular pressure, *improve* the light, and to *lengthen* the life of mantles.

To sum up, the result of fitting

Peebles
STREET LAMP GOVERNORS

is increased light and lower running costs.

Ask us to tell you what other Gas Companies have saved since using Peebles' Street Lamp Governors.

PEEBLES & CO. LTD.
Tay Works
Bonnington,
EDINBURGH

E.I.H.

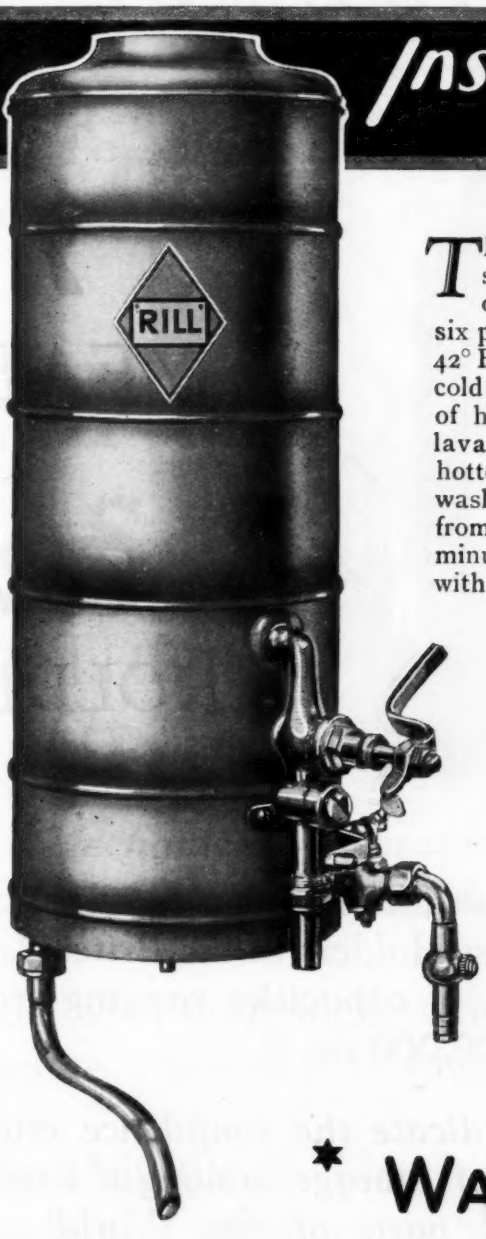
AS APPLIED TO A 2,000,000 C.F.T. GASHOLDER AT SWANSEA.

THE
MILBOURNE ROLLER CARRIAGE
FOR
SPIRALLY-GUIDED GASHOLDERS
PROVIDES
CONTINUOUS & AUTOMATIC OIL LUBRICATION.
A BOON IN SEVERE WEATHER.

C. & W. WALKER, LTD. DONNINGTON, Nr. WELLINGTON, SHROPSHIRE.
LONDON OFFICE: 70, VICTORIA STREET, WESTMINSTER, S.W. 1.

★ *Here's an*

Instantaneous Success!



THIS Water Heater is of the sealed chamber type and will deliver hot water at the rate of six pints per minute, with a rise of 42° F. over the temperature of the cold water supply. At this degree of heat the water is suitable for lavatory basin purposes. For hotter water, necessary for dish-washing, etc., the delivery is from four to five pints per minute. The Heater is provided with lugs for fixing to the wall without any supporting shelf All that is necessary is to connect to existing gas and water pipes.

The 'RILL' INSTANTANEOUS ★ WATER HEATER

¶ Constructed in heavy tinned-copper throughout and supplied with the exterior finish in polished copper or white cellulose enamel, as preferred. Fitted with water valve which permits of adjustments to accommodate varying water pressures; also with interlocking gas and water taps. This fitting, which incorporates a Pilot Jet, is chromium plated.

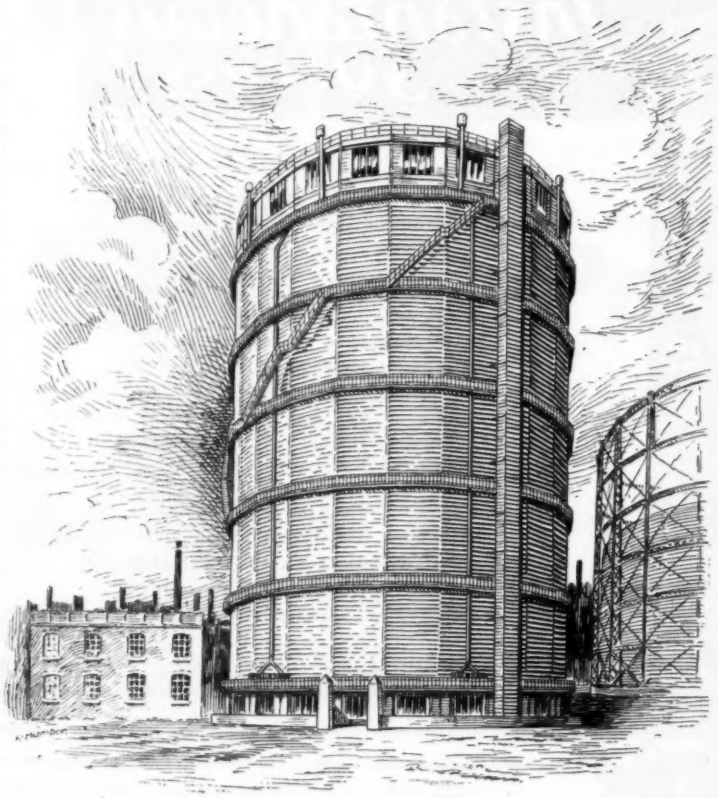
Illustrated Lists on Application.

FLETCHER RUSSELL & Co., Ltd.

4, Berners Street, London, W.1. **Works, Warrington.**

(Radiation Ltd., Proprietors.)

CONFIDENCE



7
YEARS

32
HOLDERS

In 7 years, British Licensees have erected 32 M.A.N. Type Waterless Holders in the British Isles and 5 in the Colonies, of capacities ranging from 100,000 cu. ft. to 8,000,000 cu. ft.

These figures indicate the confidence established by this class of storage amongst British Gas Engineers in all parts of the World.

LICENSED CONTRACTORS:

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CLAYTON, SON & CO., Ltd., LEEDS
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E. COCKEY & SONS, Ltd., FROME

BRITISH EMPIRE LICENSEES:

WATERLESS GASHOLDER Co., Ltd.

13, Rood Lane, LONDON, E.C.3

EFFICIENCY AND RELIABILITY

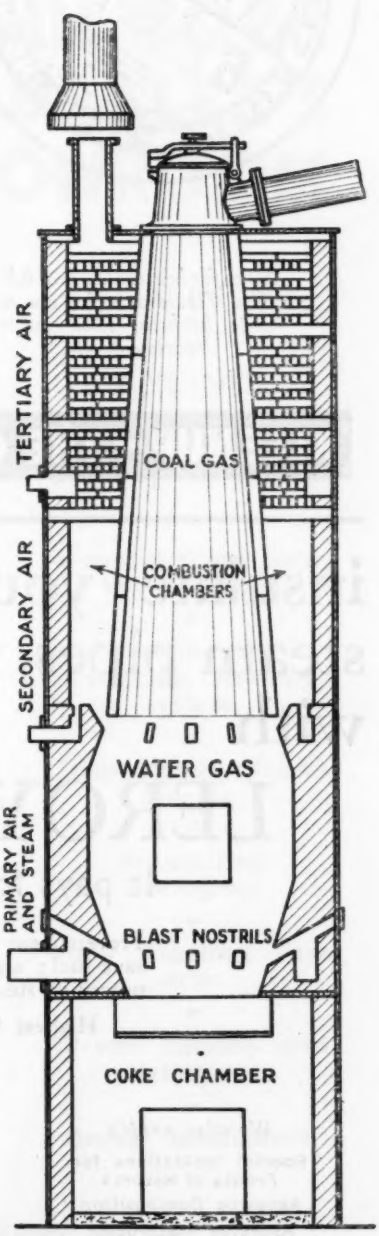
To improve your plant and increase your output at less cost

instal

THE MOORE GAS PLANT

140 THERMS PER TON
QUALITY — 400 B.Th.U.

Mechanically operated
All the usual Residuals



You need equipment which will operate efficiently at low cost.

The MOORE plant will increase the efficiency of your gas making and will reduce your depreciation and maintenance charges.

Full particulars on application to the sole licencees and manufacturers

ANDREW BARCLAY, SONS & CO., LTD.
GAS DEPARTMENT, CALEDONIA WORKS, KILMARNOCK

Put "KLEENUP" through its paces

Test "Kleenup"—the absolutely NON-SCRATCH wonder cleaner for gas cookers—for yourself, and judge if this isn't the perfect preparation to keep your gas cookers looking as *you* want them to look . . . the kind of cleaner you ought to feature in your Showroom.

"Kleenup" will more than "satisfy" you. See how it deals with grease and grime. How they disappear with a few seconds' work. Try how easy "Kleenup" is to use; and remember, *"Kleenup" contains no caustic.* It can be used with perfect safety for cleaning the hands of dirt and grease, etc. No need for gloves or brush.

Write us for a generous FREE sample and prove "KLEENUP" for yourself. What *you* say goes!

In tins for household use at **6d.** *Also 7lb. drums for use in large kitchens, stove repair department, etc.*

Manufactured by
ASTRAH PRODUCTS, St. Helens, Lancs.
Head Office: **7, High Street, Sutton, Surrey.**
Telephone: Sutton 5127.

'KLEENUP'—THE GOOD COMPANION OF THE GAS COOKER

insulate your boilers, steam pipes, mains, etc. with

LEROY'S COMPOSITION

It pays for itself and more in a few months

Prevent heat radiation; save fuel; and increase power of steam.

Experienced workmen sent anywhere at any time.

Highest insulating efficiency with great mechanical strength

We also supply
Special Insulations for Fronts of Retorts
Asbestos Composition
Asbestos Mattresses
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Silicate Cotton
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Sectional Coverings

IN USE ALL OVER THE WORLD.

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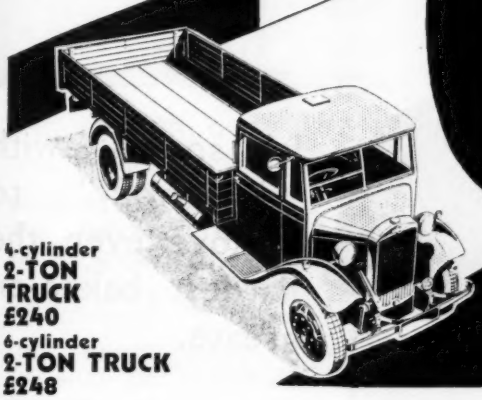

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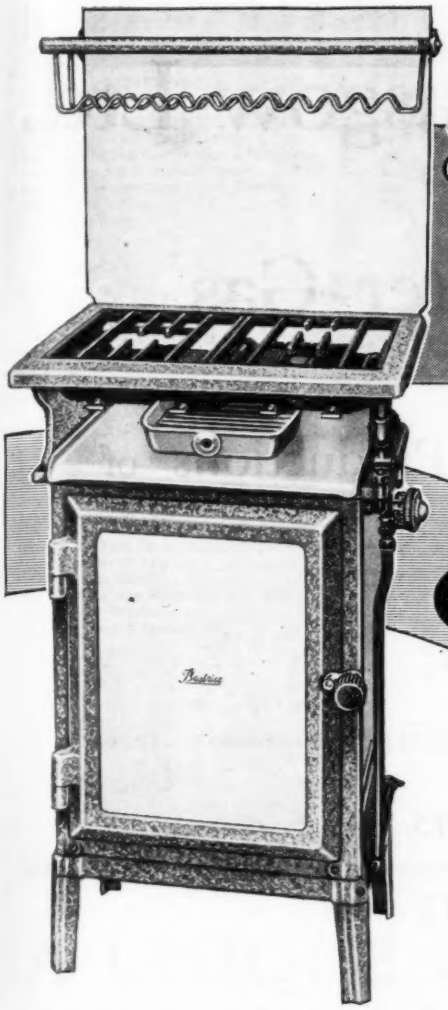

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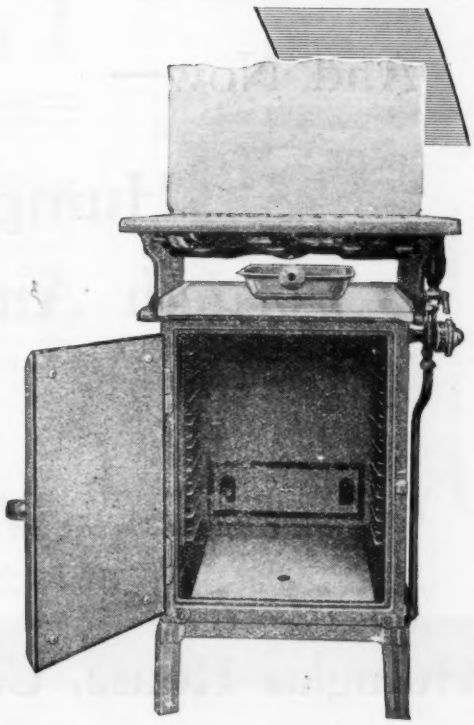

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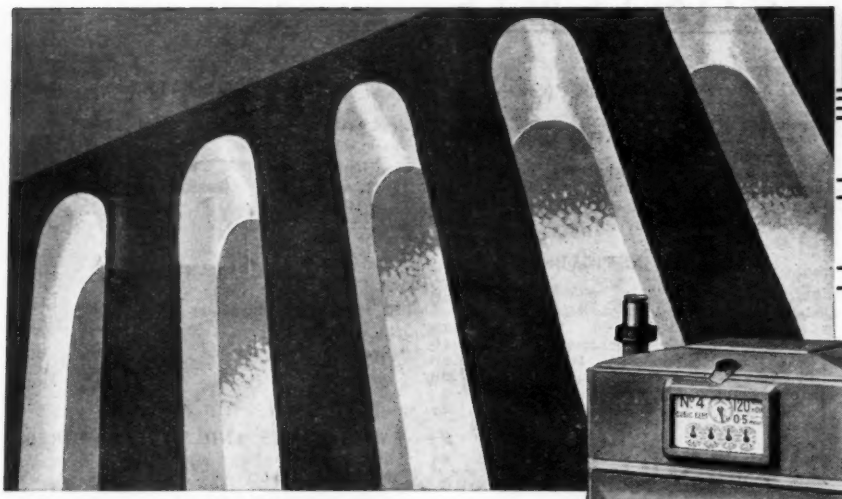

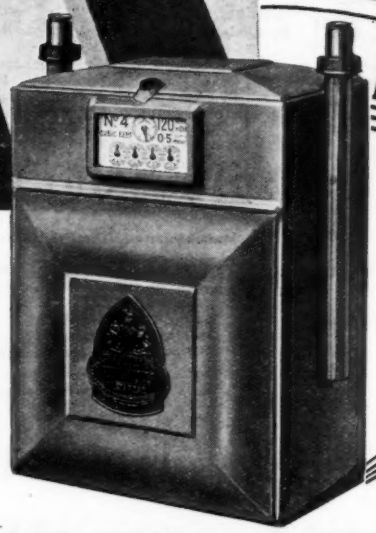

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THE GAS JOURNAL

APRIL 26, 1933

Vol. 202. 85th Year No. 3649

A Glance at the Contents—

Coke Oven Effluents.

In a paper before the Northern Section of the Coke Oven Managers' Association, Dr. B. A. Southgate refers to investigations into the toxicity of coke oven effluents. [p. 216.]

Sulphur Recovery from Spent Oxide.

A contributor discusses a process by means of which the sulphur can be extracted from the oxide and obtained in a reasonably pure condition without excessive heating. [p. 219.]

Book Reviews.

Among books reviewed are "Gas in Modern Life," by R. Ellissen; "Gas Appliances and their Effect on the Composition of the Air of Rooms," by R. Grassberger and A. Luszczak; and "Patents Simplified," by H. J. W. Wildbore. [p. 214.]

Uses for Gas in Industry.

Mr. G. D. Morton, Industrial Representative to the Manchester Corporation Gas Department, read a paper on this subject before the Manchester Junior Gas Association on April 1. [p. 221.]

Hong Kong and China Gas Company.

At the annual meeting of the Company, a dividend at the rate of 10% per annum, free of income-tax, was declared for the year ended Dec. 31 last, less 5% interim dividend paid in October, 1932. [p. 225.]

A Prize-Winning Model Gas-Works.

In a paper before the Scottish Junior Gas Association (Eastern District), Mr. James Storrier, of Dundee, describes how the members of the Technical Staff of the Dundee Gas Department constructed the model gas-works which won the first prize in the competition recently organized by Messrs. Newton, Chambers, & Co., Ltd. [p. 223.]

Forthcoming Engagements

April 29.—I.G.E.—Written Examinations in Gas Engineering.
April 29.—Western Junior Association.—Meeting at Bristol. Presidential Address.
May 1.—I.G.E.—Meeting of Meters Committee, 2.30 p.m.
May 4.—I.G.E.—Meeting of Joint Lighting Committee, 2.30 p.m.
May 4.—Midland Junior Association.—Annual General Meeting and Address by Mr. W. B. M'Lusky.
May 5.—North of England Association.—Annual Meeting, County Hotel, Newcastle, at 2 o'clock.
May 5.—N.G.C.—Annual Meeting of District Executive Board for Scotland, N.B. Station Hotel, Edinburgh.
May 5.—Federation of Gas Employers (Scotland).—Annual Meeting, N.B. Station Hotel, Edinburgh.
May 5.—London and Southern Junior Association.—Annual Business Meeting.
May 6.—I.G.E.—Written Examinations in Gas Supply.
May 6.—Manchester District Junior Association.—Visit to Runcorn Gas-Works. Paper by Messrs. H. Goodier and W. E. Saunders.
May 9.—I.G.E.—Meetings of Finance Sub-Committee, 9.30 a.m.; Finance Committee, 10 a.m.; Executive Committee of the Council, 10.30 a.m.; Council, 2.30 p.m.; Gas Education Executive Committee, 4 p.m.
May 10.—N.G.C.—Annual Meeting, Hotel Metropole, London, 2.30 p.m.
May 10.—Federation of Gas Employers.—Annual Meeting, Hotel Metropole, London, 3.15 p.m.
May 11.—Society of British Gas Industries.—Annual General Meeting and Dinner, Hotel Metropole, London.
May 11-12.—Eastern Counties Association.—Half-Yearly Meeting at Croydon.
May 13.—Scottish Junior Gas Association (Eastern District).—Annual General Meeting at Edinburgh.
May 17.—B.C.G.A.—Meetings of Executive Committee, 11 a.m.; General Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.
May 18.—Wales and Monmouthshire Association.—Meeting at Abertillery.
May 19.—Southern Association.—Meeting at Bridgwater.
May 19.—Manchester District Association.—Special Meeting at Leeds.
May 20.—Yorkshire Junior Association.—Meeting at Leeds. Paper by Mr. W. E. Benton.
May 25.—Midland Association. — Spring meeting at Stafford.
May 29.—I.G.E.—Meetings of Finance Sub-Committee, 2 p.m.; Finance Committee, 2.30 p.m.; Executive Committee of the Council, 3 p.m.; Council, 4 p.m., Liverpool.
May 30-June 2.—I.G.E.—Annual General Meeting, Liverpool.
June 12.—I.G.E.—Meeting of General Research Committee, 2.30 p.m.
June 13.—I.G.E.—Meeting of Gas Education Executive Committee, 4 p.m.
June 14.—Association of Statutory Inspectors of Gas Meters.—Annual Meeting in London.
June 15.—I.G.E.—Meeting of Refractory Materials Joint Sub-Committee, Stoke-on-Trent, 2.30 p.m.
June 28.—I.G.E.—Board of Examiners; Oral Examinations, 9.30 a.m.

1933 "Journal" Directory.

Page 46. Middlewich. J. Ogden appointed Engineer and Manager vice W. H. Frost.
Page 56. Romford. J. C. Wright and G. Berridge appointed Managing Directors.
Page 88. Melrose. R. J. Gavin appointed Engineer and Manager vice J. Gemmell, retired.

EDITORIAL NOTES

Grouping of Gas Undertakings

IMPORTANT matters are dealt with in the Final Report of the Gas Legislation Committee, whose labours promise a large measure of much-needed freedom to the Gas Industry. Readers may be reminded that the Committee were appointed by the Board of Trade to consider the recommendations contained in the Second Report of the National Fuel and Power Committee, and to report upon amendments to existing gas legislation which might be desirable and necessary to give effect to those recommendations by general legislation or by Special Order. The Committee, under the Chairmanship of Mr. F. J. Wrottesley, K.C., was so constituted as to be able to deal with all the aspects of the problems involved, and to frame the requisite clauses to be embodied in a Bill. Mr. Wrottesley had as his colleagues on the Committee: Mr. Jacques Abady, Mr. John Baker, Mr. R. W. Edwards, Sir William Hart, Mr. Arthur Hayday, Mr. T. P. Ridley, Mr. J. F. Ronca, Mr. A. N. C. Shelley, Mr. A. W. Smith, Mr. Will Thorne, and Sir D. Milne-Watson.

The Committee presented two Interim Reports, one in March of last year, and the other in December. In the first of these the Committee submitted recommendations as to the powers which should be granted to gas undertakers to facilitate joint working arrangements in so far as these related to the granting of facilities whereby gas undertakers might invest either in other gas undertakings or in allied industries. A Joint Committee of both Houses of Parliament subsequently considered the recommendations of the Committee in this connection, and the result was the Gas Undertakings Act, 1932, which gave effect to them. The second report dealt with the subject of gas charges, and the Committee's proposals were indicated in the "JOURNAL" for Feb. 1 last, page 250. By these noteworthy steps we arrive now at the Final Report, published by H.M. Stationery Office at the price of 9d. net (postage extra).

The matters discussed in this Final Report are placed under seven headings, and the Committee emphasize at the outset that recommendations put forward (as in the case of the two Interim Reports) are designed to relieve gas undertakers from restrictions rather than to impose additional restrictions. They do not intend therefore that legislation introduced to implement their recommendations shall (unless the context of a particular recommendation requires it) reduce the existing powers of undertakers where these afford wider facilities than the Committee suggest as suitable for general legislation.

The first of the seven chapters is on the subject of joint working arrangements, and in connection with this the Committee point to the advantage which they feel would accrue to the Gas Industry if a move were made within the Industry in the direction of the formation of territorial associations of gas undertakers for the purpose of acquiring financial interest in, or assuming control over, groups of gas undertakings in specified areas. They recognize that there are limitations on the extent to which gas undertakings can be physically amalgamated, and that there is not always a saving to be effected by the complete absorption of undertakings by neighbouring undertakers. Even when physical amalgamation or absorption is not practicable, however, they feel that groups of undertakings could in many instances, with advantage, act in conjunction with one another in regard to matters such as the raising of capital and the purchase of materials.

The Committee add that "a parent company, having financial control over a number of companies including, if possible, at least one well-established statutory gas undertaking to act as a nucleus to the organization, seems to us obviously better able to raise capital on advantageous terms than a purely local undertaking whose shares offer no particular attraction on the money market outside its own locality. Such a parent company is, again, able to place at the disposal of its subsidiaries technical advice such as could not otherwise be afforded, and to obtain terms in connection with the purchase of coal and other materials such as purely local undertakings could not command."

This matter is referred to in the Report not as one requiring immediate legislative action, but because the Committee regard it as desirable that the advantages to be derived from this type of joint working should be made known and appreciated as widely as possible in the Industry. Existing legislation in their view already provides adequate machinery in all but minor details to permit of the extension of joint working arrangements on the lines indicated. Thus the initiation of agreements between individual groups of undertakings is a matter for negotiation between the undertakings themselves, and not one for legislation.

As an example of the kind of organizations which the Committee have in mind, they point to the group of undertakings owned and operated by the British Gas Light Company, Ltd., which appears to them to be admirably constituted for the purpose of assisting in the development of areas where physical amalgamation would be impracticable and where development by self-contained local undertakings might be severely handicapped by financial difficulties. The South Eastern Gas Corporation is, of course, another instance of the tendency of the Industry in this regard.

Gas Legislation Committee's Proposals

COMING now to the proposals contained in the Final Report, the Committee express the opinion that all authorized gas undertakers, having already the necessary powers to lay mains within their limits of supply, should be given power by general legislation, and without the necessity for any special application or authority, to give or to take a supply of gas at the boundary of their limits to or from contiguous undertakers. They therefore recommend that there should be enacted in general legislation a clause to the following effect:

"Any undertakers may, upon such terms and subject to such conditions as may be agreed, give a supply of gas in bulk to, or obtain a supply of gas in bulk from, any other undertakers when the authorized limits of supply of the respective undertakers actually adjoin at the point at which they are to be crossed by the proposed main, through which a supply of gas is to be given or taken, but nothing in this section shall authorize any undertakers to lay any mains or to interfere with any street beyond their authorized limits of supply."

With regard to the obtaining of supplies either from non-contiguous undertakers or from some other source outside their authorized limits, the necessity to consider the interests of highway authorities and others makes it impossible to contemplate any general authority. They think, however, that the needs of the Industry will be met adequately, and that the interests of all parties will be protected, if the Board of Trade are authorized (by an extension of section 10 of the Gas Regulations Act, 1920) to empower undertakers to give as well as to obtain supplies of gas in bulk, and for this purpose to break up roads. Where authorized undertakers, in order to join up one part of the limits of supply with another, could do so more conveniently and economically if the necessary mains were laid under a highway which, in whole or in part, is outside their

authorized area, the Board of Trade should be empowered to authorize by Special Order the laying of such mains, subject to the condition that no supply should be afforded from the mains to any premises outside the authorized limits of supply.

With regard to financial matters, the Committee have little doubt that the operation of the auction clause today hampers undertakers in their endeavours to raise capital; further, it deters many investors from applying for shares or stock. They see no objection to a general extension of the power to offer capital for subscription by the public on terms to be approved in each instance by the Board of Trade, and so far as concerns undertakers to whom an auction clause applies and whose stocks are quoted and dealt in on the London Stock Exchange the Committee recommend suitable clauses to effect this. To undertakers whose stocks are not so quoted they would like to give some relief from the operation of the auction clause, and they suggest power should be given to the Board of Trade to dispense with the operation of the auction clause on application and on production by the undertakers of satisfactory evidence that the terms and conditions of issue proposed are such as to ensure the best return to the Company. The Committee see no sufficient reason for extending to all undertakers by general legislation power to offer capital to employees and consumers, which is now contained in various Private Acts and Orders, and suggest that it should be left to individual undertakers requiring the power to make application for the necessary authority.

While the Committee recommend that power be given by general legislation to all statutory gas undertakers to issue as redeemable preference capital or redeemable debenture stock any preference capital or debenture stock which they may be authorized to issue, they are not satisfied that there is sufficient reason for incorporating in such legislation a power to sliding-scale companies to pay fixed minimum dividends, as asked for by the Gas Industry.

The Industry asked that undertakers authorized to form a renewal fund might be enabled to maintain a larger fund than is normally authorized to-day, and some space is devoted in the report to discussing this question. Authorized contributions to the renewal fund are normally limited to ½% of the paid-up share capital in any one year, with a limit on the maximum of the fund of 5% of the paid-up share capital. The conclusions the Committee have reached in regard to this matter are that, where undertakers are authorized to maintain a renewal fund, the fund should be limited in the following manner:

> (i.) Contributions to the fund and the maximum amount of the fund should be limited by reference to the paid-up share and loan capital of the undertakers.
> (ii.) Annual contributions to the renewal fund should be limited to ½% of the paid-up share and loan capital.
> (iii.) The renewal fund should be limited to 5% of the paid-up share and loan capital in the case of undertakers supplying over 1000 million c.ft. of gas per annum and 7½% in the case of undertakers supplying less than 1000 million c.ft. of gas per annum, with a saving provision permitting of the maintenance at its existing level in money of any renewal fund in excess of 5% (but not in excess of the authorized limit) formed by undertakers before their sales reached 1000 million c.ft. per annum.

They intend that for purposes of this recommendation premiums paid in respect of issues of share capital shall be included as part of the paid-up share capital.

Non-Statutory Undertakings

THE fourth chapter of the Report discusses proposals for conferring statutory powers on certain non-statutory undertakers. The Committee are of opinion that the interests of the Gas Industry and of consumers in general would best be served by the incorporation in legislation of a provision whereby the Board of Trade are required, at any time after two years from the passing of the Act, and within the three following years, to make a Special Order conferring statutory powers and imposing the usual statutory obligations on any undertakers who, during the year preceding the making of the Order, supplied more than 30 million c.ft. of gas. Such an Order, they say, would need to apply the provisions of the Gas-Works Clauses Acts to the undertakers affected, and would need to contain the usual provisions incorporated in Private Acts and Orders regulating capital, price, and dividend.

It is assumed by the Committee that the Board of Trade, in dealing with the undertakers concerned, would select in the first place the large undertakers—those supplying over, say, 100 million c.ft. of gas—and thus the smaller undertakers would be afforded a considerable further interval during which to prepare. With regard to undertakers supplying over 20 and under 30 million c.ft. of gas, the Committee endorse the suggestion made by the Fuel and Power Committee that power be given to the local authority to apply for an Order to be made in any individual case where a satisfactory and sufficient supply of gas is not being maintained; but, in order to ensure that statutory powers are not conferred compulsorily on a 20-30 million undertaking before a 30-40 million undertaking is dealt with by the Board of Trade, the Committee suggest that this power to the local authority to apply should be exercisable only after an interval of five years from the passing of the proposed legislation.

In connection with this chapter, the Committee furnish the following definition of the type of undertaking which is to be regarded as coming within the description " non-statutory undertaking: "

> A " non-statutory undertaking " means " the gas undertaking of any company, body, or person primarily engaged in supplying gas or gas and water or gas and electricity to the public, but not authorized to supply gas by any Act of Parliament or Order having the force of an Act, and for this purpose making use of pipes or mains laid in such streets dedicated to public use as statutory gas undertakers are authorized to break up under the Gas-Works Clauses Act, 1847."

To enable the Board of Trade to carry out the duties that will thus devolve upon them, it is recommended that section 15 of the Gas Regulation Act, 1920, be amended to enable the Board of Trade to call for a return of the quantity of gas sold in any year from any company, body, or person selling gas to the public.

Purity, Pressure, and Other Points

TAKING a brief glance at the remaining chapters of the Report, it is noted that the Fuel and Power Committee endorsed, in principle, a suggestion put forward by the Board of Trade that the time has arrived when all gas undertakers, whether statutory or not, should be required to conform to the provisions of the Gas Regulation Act, 1920, in regard to purity and pressure, and that any existing illuminating standards might be repealed. As a result of their consideration of these matters, the Gas Legislation Committee submit the following recommendations:

> Any company, body, or person supplying more than 20 million c.ft. of gas in any year to the public, and for this purpose making use of pipes or mains laid in such streets dedicated to public use as statutory gas undertakers are authorized to break up under the Gas-Works Clauses Act, 1847, should within five years be required to supply gas which, when tested in accordance with the provisions of the Gas Regulation Act, 1920, shall be free from sulphuretted hydrogen.
>
> Any company, body, or person supplying gas to the public, and for this purpose making use of pipes or mains laid in such streets dedicated to public use as statutory gas undertakers are authorized to break up under the Gas-Works Clauses Act, 1847, should within five years be required to supply gas at the minimum permissible pressure defined in Section 2 (2) of the Gas Regulation Act, 1920.
>
> We do not recommend the repeal of existing standards governing the illuminating value of gas supplied by undertakers not charging on the thermal basis.

It is the opinion of the Committee that the appointment of a gas examiner to maintain a permanent watch over pressure and purity only is unnecessary, and they suggest that the situation would be adequately met by

provisions enabling a specific test to be called for on any particular occasion.

There are two chapters dealing with miscellaneous amendments to existing enactments, and in one of these the Committee say they do not recommend that gas undertakers not authorized to supply gas on the thermal basis should be rendered liable to contribute to the Gas Fund. Pending the introduction of a new Gas-Works Clauses Act, if this should at a later date be found to be practicable, there are a number of provisions which the Committee think could with advantage be enacted and made general in their application to all statutory gas undertakers, and an appendix to the Report contains a list of such provisions. Each of the clauses so indicated has already become common form.

Coke Oven Effluents

An important investigation of the problem of the toxicity of coke oven effluents was carried out during a survey of the Estuary of the River Tees by the Marine Biological Association for the Water Pollution Research Station of the Department of Scientific and Industrial Research. Reference to this piece of research was made in the "JOURNAL" last week, and in our columns to-day is an account of the work by Dr. E. W. Southgate. The Estuary has, for some years, been heavily polluted, and the salmon and sea trout fishery, which was formerly very valuable, has become almost worthless. It was shown last year that, as far as the migration periods of 1930 and 1931 were concerned, the deficiency of dissolved oxygen in the Estuary water was not, by itself, sufficient to cause the death of smolts. It was consequently concluded that the fish had been poisoned by directly toxic substances. Later experiments prove that the most important effluents, as regards toxicity, are those produced either by washing and cooling of coke oven gas or during the distillation of crude ammonia liquor resulting from the carbonization of coal.

The effluents from the distillation of ammonia liquor owe their toxicity almost entirely to the tar acids they contain. On the other hand the effluents derived from installations of coke ovens in which ammonia is recovered by the direct process contain relatively small quantities of tar acids, and their toxicity is due principally to the presence of cyanides. Both tar acids and cyanides have been found in a large number of samples of water taken from positions in the Estuary at which smolts were killed in 1930 and 1931. None of these samples contained tar acids in concentration sufficiently high to be toxic to smolts, but many of them contained cyanides in lethal concentrations. It has been definitely concluded that during the migration periods of 1930 and 1931 the mortality of smolts in the Estuary of the Tees was caused primarily by the toxic action of cyanides contained in coke oven effluents. This conclusion marks a distinct step forward, for, so far as is known, it has never been previously suggested that cyanides are responsible for the death of fish in the River Tees.

The next step was to investigate by what means, on a practical scale, the cyanides could be removed from the effluents, and Dr. Southgate tells of the success which has attended this part of the work. Large-scale tests were made at the Newport Ironworks of Messrs. Dorman, Long & Co., Ltd. The coke oven effluent containing cyanide was treated with spent pickle liquor resulting from the cleaning of steel in hydrochloric acid before galvanizing, and it has been demonstrated that the effluent can rapidly be rendered innocuous by mixing it with pre-determined quantities of spent pickle liquor and lime—the ferrous chloride of the pickle liquor reacting with cyanide to form ferrocyanide, a relatively non-toxic substance. Another method was tried at the Newport Ironworks. This consisted in spraying the heated effluent into the air as a fine mist. It was found that a substantial reduction in the cyanide content occurred when the liquor was sprayed at 58° C., the toxicity to trout being reduced to about one-sixteenth of its original value. Dr. Southgate concludes his contribution by explaining that it was impossible to apply either of the methods investigated to the whole of the cyanide-containing effluents entering the Estuary during the salmon migration season of 1932. The chief difficulty in dealing with these discharges is the very large volume of effluent to be treated; and any modification in works practice which would reduce the volume would add materially to the chances of devising a successful large-scale method of treatment.

Gas in Industry

The activities of the Industrial Section of the Manchester Gas Department were the subject of a contribution to the *Gas Salesman* for February last by Mr. G. D. Morton, Industrial Representative to the Department. What he had to say bears out our contention that, unless a gas undertaking is thoroughly conversant with all the gas appliances in use in industrial premises in its area of supply, is aware of its customers' special problems, and is equipped with both staff and accommodation to demonstrate the efficiency and applicability of gaseous fuel, not only will it fail to secure new business, but it will fail to retain existing loads. The Manchester Gas Department is alive to this and to the benefits which accrue from scientific methods of charge. "With one exception, not one turnover from gas to oil has been made in Manchester. The business has been retained mainly through the instrumentality of the two-part tariff. Since this was instituted the largest consumer to adopt it has increased the consumption from 39 to 53 million c.ft. Had no elasticity been introduced in the method of charge, we should have lost even that which we had." We quote from a paper which Mr. Morton read at a meeting of the Manchester and District Junior Gas Association this month, a lengthy extract from which is published in our issue to-day.

Mr. Morton's latest contribution is a valuable addition to his previous paper, and his description of new uses for gas will prove most helpful to other undertakings. We are glad that the author emphasizes the efficiency of modern gas furnaces, for there can be no doubt that obsolete equipment—and there is plenty of such equipment in the country to-day—is the greatest menace to the development of our industrial gas business. Remarkable strides have been made during recent years in insulation, atmosphere control, and, perhaps most important of all, automatic temperature control; and application of these improvements has enormously enhanced the Gas Industry's competitive strength. To-day, for example, gas furnaces for forging, &c., are in use running up to 40% efficiency. Mr. Morton is a great believer in the future of the pre-mixing of gas and air prior to combustion, for nowadays the uniformity of the composition and calorific value of the gas supplied is very different from what obtained prior to the passing of the Gas Regulation Act. He cites several instances where pre-mixing has solved industrial gas problems in his area of supply—in the production of wireless components, which calls for gas for heating platens for bakelite manufacture, and where the space available for combustion is limited; for de-metalling (a potential load); and for schreinering, calendering, singeing, gassing, &c. Gassing is an important process in the cotton industry. It entails the burning of loose fibres from the yarn by passing them through gas jets, and for the success of the process the correct mixture of gas and air is essential—as also is a knowledge of the whole practical working of the process.

An interesting section of Mr. Morton's paper concerns the use of gas in crematoria, and he advances a convincing case that gas is a more suitable fuel than either oil or coke for cremation work. He describes the modern apparatus, which is simple and noiseless, working on the natural-draught principle. Experience with furnaces installed in the Manchester area has shown that a cremation takes about $1\frac{1}{4}$ hours to reduce everything to ashes, the second and third consecutive cremations taking approximately 1 hour each. Roughly 1500 c.ft. of gas is sufficient when only one cremation takes place, and this figure is reduced when there are others to follow immediately after. The working costs are below those when solid fuel was in use.

OBITUARY

JOHN T. LEWIS.

The death took place on Wednesday last of Mr. John Thomas Lewis, who this year completed fifty years' service as Engineer and Manager to the Wellingborough Gas Light Company, Ltd. He died at the conclusion of an evening service at Manchester.

Mr. Lewis was the son of the late Mr. J. Lewis, who was Manager of the Higham Ferrers Gaslight Company before it was merged in the Rushden Company. He was

THE LATE MR. LEWIS.
Fifty Years Engineer and Manager at Wellingborough.

born at Higham Ferrers in 1856, and began work with his father, from whom he gained his earliest knowledge of gas production. He left the district for three years, working during that time in the North of England, and was then offered the post as Assistant to Mr. George Powell, who was at that time the Manager of the Wellingborough Gas Light Company. Mr. Lewis took up his duties at Wellingborough in 1878. Four years later, on Mr. Powell's retirement, he was appointed Engineer and Manager, which post he held until his death. In his capacity of Consulting Engineer he superintended reconstruction or erections of gasworks at Irthlingborough, Finedon, Thrapston, Burton Latimer, and Raunds. Mr. Lewis was Chairman of the Irthlingborough Gaslight Company. He was President of the Midland Association of Gas Engineers and Managers in 1898, and he held many public offices.

When deceased joined the Wellingborough Company the production of gas for the year was 24 million c.ft. Last year the make was 311 millions.

An Appreciation.

For upwards of forty years I have been proud of a close acquaintance with the late John T. Lewis, and I take this opportunity to write a few lines having reference to his strange passing and cherished memory.

He was ever of a quiet and reserved nature, and probably would not be recognized by many of our younger active engineers of to-day. Yet he was always in close touch with gas progress and served his Company with great ability, which is clearly demonstrated in the works he has left behind as a lasting tribute to his memory. He was an ardent supporter of his church and ready to assist in helping along any clean sport, and he will be missed in these activities as in many other public services he has always given to the town he loved for so long.

His helping hand and sympathy to all who were in distress will be hard to replace, and his aid was freely given to any deserving appeal.

He had a great love for travel, and I should imagine he was able to describe every cathedral in our country and many in other lands, for I have often been charmed by the descriptions his late wife and himself have given me of their discoveries in this direction.

His strange passing was such as he might have desired and a fitting end to his life of service. By his decease our Industry has lost one of its noblest characters, and Wellingborough will mourn for its greatest citizen.

J. W. S.

* * *

T. BANBURY BALL.

The death took place on Friday last of Mr. T. Banbury Ball, Manager of the Rochdale Corporation Gas-Works from 1881 to 1925. Mr. Ball, who was 84 years of age, had a severe illness a few years ago, but from this he made a good recovery, and considering his age he had been remarkably active until about a month ago.

Mr. Ball was a native of Coventry, and the whole of his working life was spent in the Gas Industry. His first appointment was at Jersey, and in 1875 he transferred his services to the Leeds Corporation. On the resignation of Mr. T. O. Paterson, the Rochdale Gas-Works Manager, in 1880, Mr. Ball was one of the applicants for the position, but the appointment was given to Mr. William Romans. He, however, only held office for twelve months, and on his departure Mr. Ball was appointed to succeed him. He took up his duties on Aug. 4, 1881, and held the position for 44 years, retiring on Aug. 4, 1925. During that time practically the whole of the plant was renewed or re-modelled, and under Mr. Ball's management the undertaking increased enormously. When he was first appointed the annual output of the works was about 270 million c.ft.; in the last year of his managership it was 670 millions.

Although Mr. Ball's retirement in 1925 had been abundantly earned by long and devoted service, the actual circumstances in which he resigned his managership were extremely painful to him and to many members of the Town Council. At that time the Gas and Electricity Departments were controlled by one Committee, and the Committee decided that 66 new Corporation houses which had been built on the Kilworth Street Estate should be supplied with electricity only. Mr. Ball protested that he had not been consulted in the matter and that the Committee's decision would seriously prejudice the prospects of the Gas Undertaking in other directions. It was characteristic of his high principle that in such circumstances he felt himself unable to continue as Manager, and therefore tendered his resignation. While accepting his resignation the Committee and the Council made it plain that they deeply respected the sincere and honourable motives which had dictated it.

PERSONAL

MR. H. D. MADDEN.

At the end of March Mr. H. D. Madden, Engineer and Manager to the Cardiff Gas Light and Coke Company, retired from the Fuel Research Board, of which he has been a member for the past four years. A letter which he received from Sir Frank E. Smith, Secretary to the Advisory Council of the Department of Scientific and Industrial Research, expressed the Council's thanks for the assistance he has given to the work of the Board. His advice and help throughout his period of membership have been greatly appreciated.

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The Institute of Fuel has awarded the Melchett Medal for 1933 to Sir JOHN CADMAN, G.C.M.G., D.Sc.

* * *

Mr. JOHN OGDEN, who was for about eighteen years at Higginshaw Gas-Works, has entered upon the duties of his new position as Gas Engineer and Manager at Middlewich Gas Light and Coke Company.

* * *

At a Sub-Committee meeting of Edinburgh Corporation on Friday it was agreed to recommend that Mr. JAMES JAMIESON, Assistant Engineer and Manager of the Edinburgh Gas Department, be appointed as successor to Mr. H. H. Gracie, the Engineer and Manager, who retires in the autumn. Mr. Jamieson belongs to a family of noted gas engineers. His father and grandfather were associated with the Industry, and his brother is at present Engineer and Manager at Johnstone. He occupied the position of Assistant Gas Manager to the Greenock Corporation, and later at Dunfermline, before being appointed to the Edinburgh Gas Department. He has been associated with Mr. Gracie in all the developments of the gas plant and organization in Edinburgh in recent years.

THE NEWS OF THE WEEK

Auction of £5000 5% B Preference Stock of the Chesham and District Gas Company will take place at the Chesham Town Hall on Wednesday next at 3 o'clock.

Matlock Council has sold the Matlock Bath Gas-Works, which cost the town £26,000 35 years ago, to the Matlock Gas Company. The price is understood to be £17,500.

Gas Supply Company, Ltd. (Melbourne).—The Directors of the Company have declared an interim dividend for the half-year ended Dec. 31, 1932, at the rate of 6% per annum.

A Reduction in the Price of Gas is announced by the Penrith Urban District Council Gas Department from 2s. 10d. to 2s. 9d. per 1000 c.ft. to take effect as from April 1, 1933.

Society of Chemical Industry.—We have received the Index to Vol. LI., 1932, Chemistry and Industry Transactions, and also the 1932 Index to the British Chemical Abstracts issued by the Bureau of Chemical Abstracts.

Institution of Gas Engineers.—On Friday, June 2, during the Annual General Meeting of the Institution, a tour of North Wales will be made. Luncheon will be at the Pier Pavilion, Colwyn Bay, and not the Oakwood Park Hotel, Conway, as stated in last week's "JOURNAL."

Principles of Directive Street Lighting will be the subject of a discussion at a meeting of the Illuminating Engineering Society to be held at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, S.W. 1, on Tuesday, May 9. All members of the Association of Public Lighting Engineers are invited to attend.

Co-Partners' Play at Hastings.—Every year sees the Co-partners' Social Club of the Hastings and St. Leonards Gas Company progressing still further. The latest innovation is a dramatic section, the members of which gave their first production at the third annual social and dance at the Palace Pier recently, when they presented a mystery thriller entitled "The Snickle."

North of England Gas Managers' Association.—The annual general meeting of the Association will be held at the County Hotel, Newcastle-on-Tyne, on May 5, under the Presidency of Mr. A. C. Hovey. After luncheon at 12.45 p.m., the meeting will commence at 2 p.m., and there will be two papers—one by Mr. A. T. Green, "A Progress Report on Refractory Materials and the Gas Industry," the other by Mr. T. Hornby, "The Preparation and Sale of Gas Coke."

Association of Statutory Inspectors of Gas Meters.—By permission of the London County Council, the Annual General Meeting of the Association will be held in the County Hall, Westminster Bridge, on Wednesday, June 14. The chair will be taken by the President, Councillor J. W. Willoughby, M.B.E., J.P., at 10.15 a.m., when the Annual Report of the Council and other business of the Association will be dealt with. The afternoon session will be devoted to a visit to Watson House.

Bradford Gas Profits and Rate Relief.—The fact that the Bradford Corporation Gas Department have, in their career, contributed £1,500,000 from their profits to relief of rates was mentioned by Councillor Wm. Leach (former Under-Secretary to the Air Ministry in the Labour Government) in the course of an address recently on the subject of Bradford's startling advance in rates. Mr. Leach is a leading advocate of municipalization of all services, and quoted this figure as an illustration of what he regards as a public blessing.

Crowds Assembled at the Guildhall the other day, we read from the latest advertisement of the Gas Light and Coke Company, which appeared recently in the London evening newspapers, when the Lord Mayor (Sir Urban Amenity) presented Mr. Therm with the freedom of the City. "We are all," said the Lord Mayor in his address, "acquainted with Mr. Therm and his magnificent record of public service. Mr. Therm is London's warmest friend (cheers) and a benefactor ('Hear, hear') to rich and poor alike." The Lord Mayor then presented Mr. Therm with a gold gas-tap.

The Stoppage at Mitchell Main Colliery, at Wombwell, throwing some 1500 men out of work, due, it is understood, to the fact that the owners cannot afford to run this pit as well as others under the output conditions permitted by the Quota Scheme, raises a serious problem of the town's gas supply. The Wombwell Council have a gas-making plant of their own which cost £46,000, but for some years past they have distributed coke oven gas from the Mitchell Main pit, and it would cost some £4000 to put the local plant into working order again for production purposes. Obtaining crude gas from other pits would involve heavy expenditure on new mains because the nearest other plant is over a mile away. Negotiations are in progress between the Council and the Colliery Company as to whether there is any way of maintaining the supply from Mitchell Main.

Glasgow Corporation and the Nitshill and Hurlet Company.—The special committee appointed by the Glasgow Corporation Gas Committee to consider a proposal by the Nitshill and Hurlet Gas Company, Ltd., to sell to the Corporation the Company's Gas Undertaking, situated within the Corporation's area of supply, reported that the Secretary of the Company intimated that his Directors were prepared to accept £4000 for the purchase of the Undertaking. Having heard the General Manager's views on the proposal, it was decided that in view of the housing scheme being erected by the Corporation in Nitshill, consisting of 260 houses, which are to be fitted with gas consuming appliances, the Corporation proposes to extend their mains and supply gas in the Nitshill area, and that the Company's offer to sell their Undertaking to the Corporation be not entertained.

The Co-Partnership Committee of the Cardiff Gas Light and Coke Company present a statement of accounts for the year ended Dec. 31, 1932, which shows that the co-partnership bonus allocation for the year 1932 has been increased to £7268 12s., which amount, with the balance brought from 1931, enables a distribution to be made at the rate of 7% on co-partners' wages and salaries for the year 1932. Co-partners' cash accounts have been credited with interest on outstanding balances, amounting to £518 15s. 7d. Savings of co-partners deposited during the year amounted to £1768 9s. 4d., a decrease of £130 18s. 8d., while withdrawals are shown at £4995 5s. 10d. In addition £182 0s. 4d. has been withdrawn for part payment of premiums under the group life insurance scheme brought into operation during the year. Ordinary Stock of the Company, amounting to £4322, was divided among qualified co-partners, the cost to the transferees being £4182 1s. 5d. A sum of £717 1s. 1d. was utilized by co-partners from their cash accounts for this purpose.

South-Eastern Gas Corporation.

Offer to Tunbridge Wells Stockholders.

South-Eastern Gas Corporation, the £2,000,000 holding Company which controls a number of important South of England Gas Undertakings, has made an offer to stockholders of the Tunbridge Wells Gas Company to acquire the whole of its capital stock (excluding stock held by the Co-Partnership Fund).

For each £100 of sliding-scale stock in the Tunbridge Wells Gas Company holders are offered either £155 in cash, or 60 South-Eastern Gas Corporation redeemable 4½% preference shares of £1 each, together with 75 South-Eastern ordinary shares of £1 each. For each £100 5% maximum stock holders are offered either £100 cash, or 50 South-Eastern preference shares together with 40 South-Eastern ordinary shares.

The offer is conditional upon acceptance by holders of not less than 55% of the Tunbridge Wells Gas Company Sliding Scale Stock, and will be withdrawn if this minimum acceptance is not obtained by Friday next.

Arrangements have been made to continue the present pension fund and co-partnership bonus schemes, and to retain the existing staff of the Tunbridge Wells Gas Company in the event of South-Eastern Gas Corporation's offer becoming effective.

THE NEWS—*continued.*

Imperial Continental Gas Association.

The Board of the Imperial Continental Gas Association have resolved that, subject to the approval of the proprietors and the verification of the accounts by the auditors, a final ordinary dividend on the £5,600,000 capital stock be paid on May 19, 1933, for the year ended March 31, 1933, to proprietors registered in the books at the close of business on April 27, 1933, at the rate of 7% (actual), less income-tax, making with the interim dividend of 5% (actual), less income-tax, paid on Nov. 29, 1932, a dividend equivalent to the rate of 12%, less tax, for the year.

The General Meeting will be held in the Cambridge Room, Great Eastern Hotel, Bishopsgate, E.C. 2, at 2.15 p.m., on Wednesday, May 17, 1933.

The Capital Stock Transfer Books will be closed from April 28 to May 11, both days inclusive.

Gas Fired Liquid Baths.

"Heat Treatment in Gas Fired Liquid Baths" is the title of the British Commercial Gas Association's latest technical publication (No. 229 of "A Thousand-and-One Uses for Gas"). Salt baths, lead baths, and oil baths for the heat treatment of both ferrous and non-ferrous metals are dealt with from the practical, and to some extent from the theoretical, point of view, the text being plentifully illustrated with photographs of typical installations throughout the country. Considerable attention is devoted to furnace design and a number of sectional drawings are given. The theory, scope, and practice of cyanide hardening are treated in some detail.

The whole approach is from the rational point of view that the choice of processes and plant should be governed by more theoretical knowledge of their fundamentals than has often been the case in the past. For this reason more than usual stress has been laid on the underlying reasons for various furnace designs and on a simple explanation of the metallurgy of case hardening.

The practical points which relate to the everyday working of the processes described are not neglected, and a number of practical suggestions are given for improving the ordinary routine of heat treatment.

An Up-to-Date Distribution Department.

An interesting description was given in the *Shrewsbury Chronicle* for April 14 of the up-to-date methods adopted by the Shrewsbury Gas Light Company in their Distribution Department.

On the ground floor is the garage, heated with the latest panel radiators from an automatically controlled gas unit. Above, the tinsmiths' shop provides ample space for the sheet metal work, and the making of canopies for cookers, surrounds, flue pipes, &c.

The ground floor of the main building contains the most interesting department, for it is here that the dirty gas cookers from the district undergo a "spring clean," and in most cases are turned out better than new. The explanation is that old cookers, originally black, are now colour-treated. The used cookers, some of them thickly coated with grease, are dissembled and the parts placed in an oven heated by surface combustion. In 40 or 45 minutes the castings are perfectly clean, ready to receive a new coat of paint or enamel.

"Spray" painting is carried out in a special cabinet; the process of stoving follows; and there is the completed cooker. This is an entirely new department, and replaces the old cumbersome method of "degreasing." Previously the castings were plunged into a bath of boiling potash, and there was no variation from the black finish. With the new process a month's work can be accomplished in a week.

The bright displays of coloured fires in the Company's showrooms during the winter months are the result of the work of this department.

The general store contains an enormous stock of fittings, appliances and spare parts, arranged on an up-to-date principle, in keeping with the perfectly organized system of the department. Loss of time is cut to a minimum. When a man leaves the works on a job each day he finds his materials already provided for him by the storekeeper.

There is a meter testing and repairing shop, and among the stock the dual-coin meters, those to take either shillings or pence, have made their appearance.

A laboratory, a stockroom which gives more accessibility and ease of control, and gas fires in great variety ready for building in with new houses are other sections of interest. All these things make for more efficient service to the consumer.

The same perfect system of organization is to be found in the offices, where a record of any piece of equipment sent out by the Company can be traced in a matter of seconds. A valuable addition is the lecture hall, mostly for staff use.

The whole idea of the arrangement of the department has been not only to facilitate supervision of the work, but to speed up things generally. It has been systematized as far as possible, and provides proof of the sound and enterprising lines on which the concern is progressing.

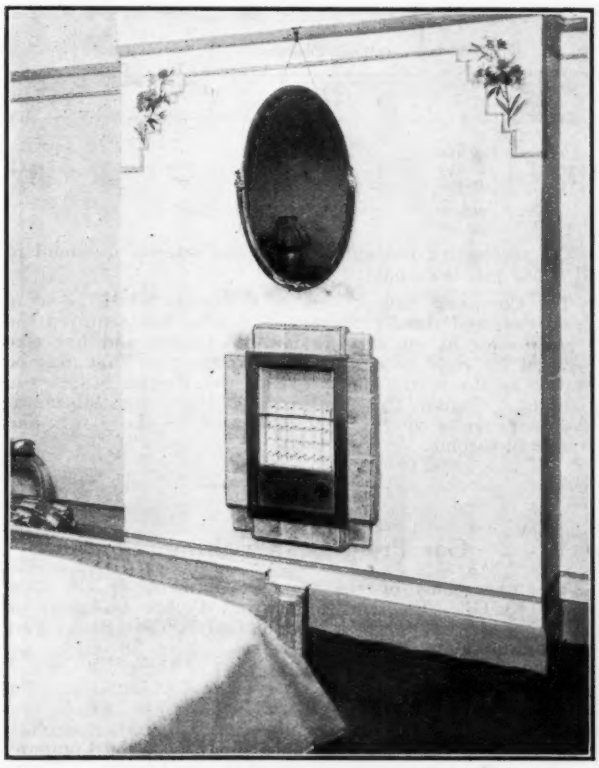
Falsification of Accounts.

On Friday last the Manchester Gas Committee had presented to them by the Town Clerk a report upon the defalcations by Mr. H. Garner, who recently committed suicide at Wallasey.

The particular nature of the fraud committed by Garner, who was a trusted official of the Department, was of a very ingenious character. It involved alterations of accounts and documents after they had been finally checked and re-checked by the audit staff; and steps have been taken to make such alterations in the system as will prevent this particular fraud occurring again. The defalcations have taken place since May, 1922, and the actual amount involved is £4181. The fraud occurred in 26 instances.

The fraud in question and the very complicated method adopted to perpetrate cannot be entirely guarded against where a trusted official is prepared to commit forgery and falsification of accounts.

Modern Gas Heating.



A Parkinson "Pano" Fire in the bedroom of the Gale ("Woman's Journal") House at the "Daily Mail" Ideal Home Exhibition, Olympia.

THE NEWS—continued.

All-Round Price Reductions at Weymouth.

The Directors of the Weymouth Consumers' Gas Company have announced that from the last quarterly reading of meters the price of gas in the Upwey and Broadwey districts will be similar to that charged in the Weymouth area. In addition, the price of gas to the whole area of supply will be reduced to 9½d. per therm, which is the equivalent of a reduction of 2½d. per 1000 c.ft. of gas. Prepayment consumers will receive a further special installation rebate of 1d. per 1000 c.ft.

The following increased discounts will also come into operation at the same time:

New Rates.		Old Rates.
50,000 to 100,000 c.ft. per quarter	5 % discount ..	*Nil*
100,000 ,, 200,000 ,, ,,	7½ ,, ,, ..	2½ % discount
200,000 ,, 300,000 ,, ,,	10 ,, ,, ..	5 ,, ,,
300,000 ,, 500,000 ,, ,,	12½ ,, ,, ..	10 ,, ,,

For consumptions of more than 500,000 c.ft. per quarter, and for gas used for power purposes, special rates are quoted.

British Tar Products.

British Tar Products, stated the *Financial Times* in a recent "Potential Investments" column, was registered at the close of 1920 to acquire the business of a firm of the same name, registered in 1916, and was made public in 1925.

The Company operate as tar distillers, chemical manufacturers, &c., their products including refined tar, benzole, creosote, cresylic acid, pure naphthalene, &c.

Good earning capacity has been maintained each year, the figures for 1931-32 being particularly satisfactory, having regard to the continued exceedingly difficult conditions. After making adequate provision for depreciation and reserves, substantial distributions have been made to the ordinary shareholders—namely, ranging from 12½% to 15% during the last five years.

The results for the last three years are summarized in the following table:

Year to Sept. 30.	Net Profit.	Ordinary Dividends.			To Reserve.	Carry Forward.	Stock.
		Int.	Fin.	Bon.			
	£	%	%	%	£	£	£
1930 . .	46 414	..	10	5	..	1173	5868
1931 . .	40,499	5	5	2½	7000	2116	8463
1932 . .	49,150	6¼	3¾	5	..	3217	7523

On account of the current year an interim dividend of 6¼% has just been paid.

The Company have taken up a process which is being tried out, and should it prove successful has acquired the right to use it on very favourable terms, and has also secured the right to a substantial interest in what may be stated as the world rights except the United States and Canada. Should this realize its fullest possibilities it should prove a very valuable adjunct to the assets and source of income.

Gas Progress in Baltimore.

The operations of the Gas Department of the Consolidated Gas, Electric Light, and Power Company of Baltimore, as set forth in the Company's Year Book, were affected by a number of adverse factors, including decreased purchasing power on the part of the public, which entailed economy in usage; the unemployment situation; the availability of competitive fuels selling at distress prices; and higher than normal winter temperatures. Notwithstanding these unfavourable conditions, the Company made progress in certain phases of its gas business. There was an increase in the number of gas central heating installations, which totalled 3891 at the end of 1932. During the past year the Company was able to obtain contracts covering the sale of gas for industrial and commercial purposes which should represent considerable additional revenue, and under normal conditions should show still further increases.

The amount of revenue from the sale of gas, the quantity of gas sold and the number of customers, in comparison with the year 1931, were as follows:

—	Year 1932.	Year 1931.	Decrease.	Decrease.
				%
Revenue from gas sales	$8,769,276.21	$9,136,247.93	$366,971.72	4·02
Gas sold, c.ft. . .	11,255,948,600	11,822,079,800	566,131,200	4·79
Customers at end of year	194,338	197,725	3,387	1·71

Extensive tests and investigations have been and are being made to develop new uses of gas, among which is air conditioning. Even under prevailing conditions the economy of utilizing gas for industrial and commercial applications has been confirmed.

During 1932 the acquisition of the Havre de Grace Gas Company, supplying gas to Havre de Grace, Aberdeen, and Bel Air, added about 850 new customers and thirty-four miles of main to the Company's system. Interconnection of the two distribution systems was made by a small high-pressure transmission line sixteen miles long. These additions increased the aggregate mileage of gas main as at the end of the year to 1412.

During the year a 7 million c.ft. waterless gasholder was constructed in the northern section of Baltimore, where the demand for gas is greatest, increasing the gas storage capacity and rendering more flexible the existing distribution facilities and generating plant.

Institution of Gas Engineers.

Copies of the following recently issued British Standard Specifications may be obtained, price 2s. each, from the Secretary of the Institution of Gas Engineers, 28, Grosvenor Gardens, London, S.W. 1: Woven Wire and Perforated Plate. Sieves and Screens for Industrial Purposes. (No. 481-1933); Wrought Iron and Mild Steel Hooks (No. 482-1933).

"The Thomas Recording Gas Calorimeter" is the title of Research Paper No. 519, of the Bureau of Standards of the U.S. Department of Commerce.

It can be inspected in the Library of the Institution.

Devon Gas Association.

Over £10,000 More Capital to be Raised.

For twelve years the Devon Gas Association, Ltd., has paid a dividend of 7½%, and a similar dividend was declared at the 27th annual meeting held at Exeter on April 4.

As the undertaking now embraces eleven works and continues to extend, the Association is issuing over £10,000 more capital, partly in ordinary shares and partly in debentures, but it is expected that this will be taken up by the present shareholders, who have the first option.

The £10 ordinary shares are to be offered to present shareholders at £12 each, which the Directors consider "a fair compromise between the par value and the market value."

At present the Company's capital consists of £60,460 in ordinary shares, £6000 in 7½% cumulative preference shares, and £15,166 in 5% mortgage debentures. The profit for 1932 was £6333.

In presenting the Directors' report and the accounts, Mr. WILLIAM CASH, the Chairman, said he thought the increase of 2% in the sale of gas was very satisfactory. He referred to the extensions at Kingsbridge and the large expenditure on mains at Buckfastleigh and Cullompton, and said that at Bradninch, where they had laid four miles of steel mains and built a gasholder, they already had 80 new consumers.

They were also proposing to take over the Undertaking

THE NEWS—continued.

of the Ashburton Urban District Council, and the Order relating to the purchase was now before the Board of Trade.

The report and accounts were unanimously adopted.

Mr. Thornton Willey was re-elected a Director on the motion of Mr. P. S. HOYTE, seconded by Mr. R. J. REW. Lieut.-Col. W. C. Smith was re-elected Auditor.

The CHAIRMAN spoke appreciatively of the work of Mr. Rew (the Managing Director) and his son, the Managers at the various works—at Buckfastleigh, Chagford, Chudleigh, Cullompton, Ivybridge, Kingsbridge, Lyme Regis, Moretonhampstead, North Tawton, South Brent, and Sturminster Newton—and also of Mr. G. Lane, the Secretary: and he proposed a vote of thanks to them.

Mr. F. C. DOBSON seconded and the motion was carried, as was also a vote of thanks to the Chairman, proposed by Mr. DOBSON.

Chester Company's Co-Partnership Dinner.

The second annual co-partnership dinner in connection with the Chester United Gas Company was held at the Bars Hotel, Foregate Street. There was almost a full attendance of the Co-Partners in the Company, the number present being approximately 100, and Sir John Frost (Chairman) was supported by five of his co-Directors—namely, Mr. J. P. Gamon, Mr. T. Gibbons Frost, Mr. J. T. Golder, Mr. Laurence M. Synge, and Mr. W Cullimore. Others present included Mr. J. H. Noble (Engineer), Mr. Harry Hopkinson (Secretary), and Mr. T. Lionel Jones (Assistant Secretary).

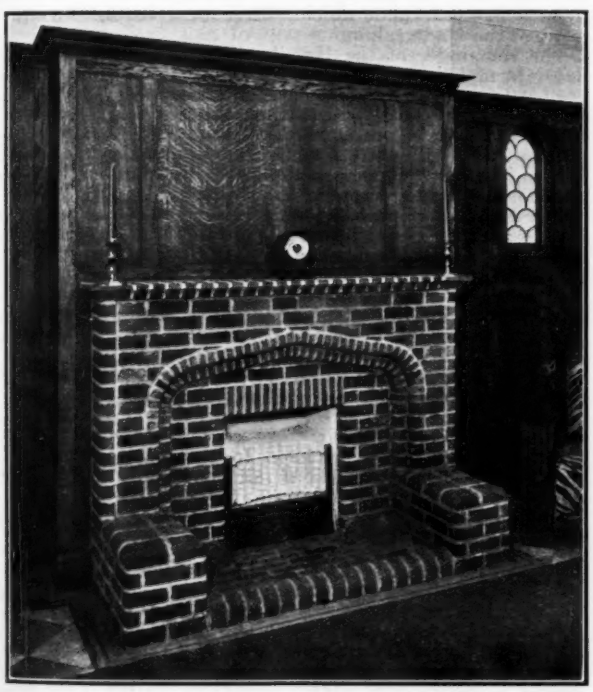
"The Company and its Co-partnership Scheme," which followed the Loyal Toast, was proposed by Mr. J. Barker, who expressed the feeling of the gathering when he said they were very pleased to have with them this year Sir John Frost.

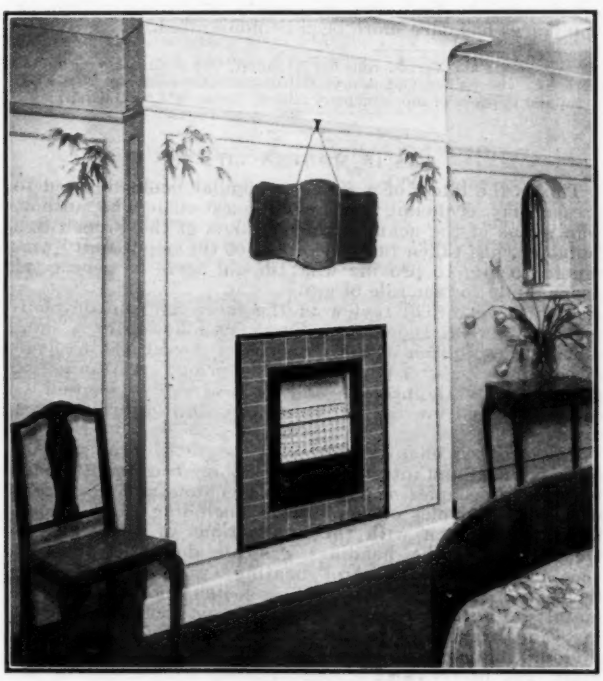
Mr. L. M. Synge, in replying, remarked that they were all co-partners in the Company. He read the Chairman's speech at the co-partnership meeting recently with great interest. What interested him particularly was what Sir John said in advising co-partners to be very quick about buying when they wanted stock. In his office in Liverpool he dealt in Chester gas stock, but he had not had a deal for months, because there was not any. There was no seller; the market was "all buyers." The Company had given notice to pay off 5% debenture stock, and hoped to make an issue at a lower rate, which was good business from the Company's point of view, and the point of view of all of them.

Mr. H. Hopkinson, in proposing "The Chairman and Directors of the Company," said it was a very great pleasure to do so. Mr. Barker had referred to their delight at having Sir John with them. This month he would have completed 29 years as Director and 21 years as Chairman of the Company. He was elected Chairman of the Company in 1912. Their Deputy-Chairman, Mr. Gamon, had been on the Board 27 years, Mr. Gibbons Frost 21 years that month, Mr. Farmer, who was hoping to have been there that night, 17 years, Mr. Synge 8 years. Since Sir John's appointment as a Director he had seen the Company extended from 208 millions to 450 millions. Since 1904 it had increased 2¼ times. Since the profit-sharing scheme started in 1902—Mr. Gamon's father being the instigator of that scheme—a matter of £20,000 had been distributed in bonuses. The amount of stock held by co-partners, retired co-partners, and deceased co-partners' representatives, together with the balance of bonuses in the books at the moment, was £12,000. For a Company the size of theirs it was something to be proud of.

Mr. J. P. Gamon said it gave him a great sense of satisfaction to respond, when he recollected that his grandfather was Director of the Company, his great-uncle General Manager, and his father Chairman of the Company. There was nothing that would make more for the welfare of the Company and the public than the increase of shareholding by the employees.

Further Views from Olympia





On the left is a Sugg "Red Sphinx" Fire in the Dining Room of the Gale House (furnished and decorated by the "Woman's Journal"); while the right-hand photograph shows a Davis "Panella" fire in the bedroom of the house. Visitors to the "Daily Mail" Ideal Home Exhibition at Olympia have had an excellent chance of seeing gaseous heating at its best.

BOOK REVIEWS

GAS APPLIANCES AND THEIR EFFECT ON THE COMPOSITION OF THE AIR OF ROOMS.*

The present monograph is one of a series devoted to hygiene and contains three original papers describing work carried out by the authors and their collaborators in the Institute of Hygiene of Vienna University:

(1) The alterations occurring in the air of kitchens when a gas cooker is in use.
(2) The measurement of the quantity of gas escaping from faulty service pipes.
(3) The Aerokrit, a new method for the continuous quantitative analysis of the air of rooms.

One of the main points investigated was the conditions under which carbon monoxide may be formed. Experiments were carried out under a variety of conditions and with varying degrees of ventilation. It was found that, with deficient ventilation, carbon monoxide does not commence to be formed with properly constructed appliances until the oxygen concentration of the air of the kitchen falls to 14%. This is a condition unlikely to arise in the ordinary course of events, since the room would become too hot for comfort, and long before this concentration were reached the need for ventilation would become essential. It was also found, in confirmation of work carried out in this country, that carbon monoxide may be formed when large vessels of cold water are placed very close to the burners, though this can readily be remedied by the use of bars which keep the vessels away from the burners.

Two forms of apparatus were developed for measuring the volume of gas leaking from untight pipes. To this end a systematic investigation is made of the piping between consecutive cocks, the rate of fall of pressure being an indication of the volume of gas escaping. The method is able to detect and measure quite small leaks.

The oxygen content of the air of a room is continuously measured by means of the Aerokrit—a modified bunsen burner fitted with a chamber around the primary air inlet. A controlled amount of air is admitted to this chamber and the burner is supplied with a standard quantity of gas per hour. The height of the internal green cone of the flame is a linear function of the oxygen concentration of the air and increases progressively as the oxygen content falls. The accuracy is stated to be ± 0·1%, and the apparatus is likely to prove very useful.

The subject-matter of the monograph represents an important piece of work and is worthy of close study. It is satisfactory to find that the safety of domestic cooking appliances has once more been demonstrated.

* "Gasgeräte und Veränderung der Raumluft," by R. Grassberger and A. Luszczak. [Berlin and Vienna 1933, Urban and Schwarzenberg. Pp. VIII. + 104 and 15 pages of supplementary tables. Price, RM.6 unbound.]

GAS IN MODERN LIFE.*

This is the latest of a series of popular books devoted to present-day economic and social questions. The author, who is one of the acknowledged leaders of the French Gas Industry, has taken full advantage of the opportunity presented to him to provide what should serve as very good propaganda for the sale of gas.

A short historical review of the inception and development of the Gas Industry in France is followed by a summarized description of the sequence of operations involved in the manufacture, purification, metering, and storage of gas. Horizontal, inclined, and vertical retorts as well as coke-ovens and low-temperature carbonization are touched upon.

The next two chapters deal with the distribution system, both external and internal. Then follows the longest chapter, which occupies nearly half the volume and deals first with the principles of combustion, including surface combustion and then with the applications of gas. This is treated under the headings gas for domestic purposes (cooking, heating, central heating, water heating, refrigeration, washing, ironing, and lighting), gas in the metal industries (tempering, hardening, reheating, melting, and brazing of metals, with special reference to individual industries), gas in the manufacture of pottery and glass, gas in the textile and printing trades, gas in the food industry and in hotels, gas for steam raising and power production, gas in hairdressers' establishments and public baths, gas in the varnish, lacquer, plastic, and wood-working industries, in horticulture and agriculture, and in the manufacture of artificial gems, gas for town lighting and internal combustion engines, gas in hospitals and in medical and dental practice, and, finally, gas in the amusement industry (inflation of balloons at public fêtes).

The utilization of the bye-products of the Gas Industry is then discussed, special attention being paid to coke grading.

Gas-works legislation and gas charges form the subject of a further chapter and, in conclusion, the importance of the Industry in the political economy of the nation is discussed. It may be noted that, in France, there are some 700 works, of which approximately 100 are municipally owned. The others are owned by companies working under concessions. Five million tons of coal are carbonized per annum, and, in 1931, the quantity of gas sold was 64,000 million c.ft., of which about one-sixth was used in industry.

Within a small compass, a vast amount of information likely to interest a wide circle of the reading public has been presented in an attractive manner. It goes without saying that the author has not neglected to point out the hygienic and other advantages of the use of gas.

* "Le Gaz dans la Vie Moderne." By Robert Ellissen [Paris 1933. Félix Alcan. Pp. 232; 33 figures. Price 15 francs, unbound.]

WATER ENGINEER'S HANDBOOK AND DIRECTORY, 1933.*

The 1933 edition of the "Water Engineer's Handbook and Directory" is as complete and comprehensive as its predecessors, and, so many changes having taken place since the last issue, it constitutes virtually a new book.

The section devoted to the Directory has been thoroughly revised up to the end of 1932 and includes details of the source of supply, character, and treatment of water, developments contemplated, chief officers, &c., of water undertakings in England, Wales, Scotland, and Ireland. Further sections in the Directory are devoted to waterworks statistics, showing the populations served, consumption, storage, and distribution, indicating the comparative importance of undertakings; a full list of engineers, resident, deputy, and assistant engineers, secretaries, and analysts, and the authorities to which they are attached; a list of Catchment Boards and Drainage Authorities established under the Land Drainage Act, 1930.

Progress in water supply in 1932 was notable not so much in the starting of new works as in the completion of many. The industrial depression, accompanied by the wave of national economy, entailed the postponement or curtailment of a number of schemes. It is interesting to note, however, that the Metropolitan Water Board have entered upon a five-year plan which will mean a steady development of the Undertaking.

The remainder of the Handbook is packed with useful data, formulæ, and special articles which are constantly needed for reference; and among the special features may be mentioned "The Treatment of Water," which is a new exposition by an acknowledged expert; "Engineering Geology as Applied to Waterworks Practice," by Edgar Morton, M.Sc.; "Review of Case and Statute Law of 1932 as Affecting Water Supply Undertakings," by H. T. Seymour, F.R.Econ.S., whose contributions on the same subject as affecting gas undertakings are well known to readers of the "JOURNAL;" and "The Rainfall of 1932," by John Glasspool, M.Sc. An interesting hydro-geological map of England and Wales is included in Mr. Morton's article. The data and formulæ include rainfall records, evaporation, and percolation; storage and compensation, weirs and reservoirs; aqueducts, pipes, and distribution; purification of water; prime movers and pumps; and many other important features. An overseas section gives details of the main supplies of the Dominions.

The Handbook and Directory contains everything the engineer wants close at hand for every reference, and should prove indispensable to all connected with waterworks practice both at home and abroad.

* Published by "Water and Water Engineering," 30 and 31, Furnival Street, Holborn, E.C. 4. Price, 8s. 6d.; by post, 9s.

PATENTS SIMPLIFIED.*

"Patents Simplified," written and published by Herbert J. W. Wildbore, Patent and Trade Mark Expert, of 101, Leadenhall Street, London, is a real effort to explain, in simple language, the highly technical Patent Law and Practice for the benefit of manufacturer, merchant, and inventor. This up-to-date book explains the law govern-

* "Patents Simplified"—written and published by Herbert J. W. Wildbore, Patent Agent, 101, Leadenhall Street, London, E.C. 3; price, 5s. net bound octavo size, and in pamphlet form 8d., post free.

ing this subject, takes account of the alterations brought about by the recent amending Act of 1932, and discusses various aspects of the whole subject, including the types of idea or invention which may be protected by Letters Patent and the ultimate methods of introducing the invention to the Market.

It is noticeable that the writer urges manufacturers, and others to use their skill in evolving new methods of manufacture as an antidote to trade depression.

The book also explains the position of patents and their protection in Foreign and Colonial Markets, and gives much information in simple form which should be of the greatest service to manufacturers and inventors alike.

CHEMICAL ENGINEERING AND CHEMICAL CATALOGUE.

The 1933 Edition of the "Chemical Engineering and Chemical Catalogue," published by Leonard Hill, Ltd., 231, Strand, W.C. 2, shows expansion in the number of firms co-operating in its production. As before, the compilation has been in the able hands of Dr. D. M. Newitt.

The extension of the Main Index has proved highly successful, and it has been fully revised and brought up to date for the present, and ninth, edition. This index is, in this issue, translated into Spanish, and it thus forms a most useful Spanish-English technical dictionary. The volume is bound in leather cloth and the index tabs are easily identified.

In a foreword Sir Robert Hadfield, Bart., says "we can face the future with a spirit of tempered optimism, though trade conditions are, and must remain for some time, such that very skilled pilotage will be required for all our enterprises. It is in this respect that such works as the 'Chemical Engineering and Chemical Catalogue' more than justify their existence as a means of rapidly obtaining reliable information, of saving time and money, and of stimulating new ideas."

Carbonization of Coal of Relatively Low Coking Power*

The results of gas-making tests carried out upon the Yard seam of the Northumberland coalfield form the subject of a Fuel Research Report just issued by the Department of Scientific and Industrial Research. The work described may be regarded partly as an extension of the laboratory examination already published of the Northumberland Yard seam and partly as an elucidation of a problem of particular interest to gas-works. In the words of the Report, "The type of coal which is most in favour for gas manufacture is that which combines the property of giving a high yield of gas with sufficient coking power to give a strong and readily salable coke containing only a low proportion of coke of small size. Coal of this type is not available in all districts, and the possibility of bringing coal belonging to the lignitous class of Seyler's classification into the gas-making category was one which was regarded as of considerable interest to the country in general. Coal of the latter type, being high in oxygen and less strongly coking, has the double disadvantage in gas manufacture of giving a smaller yield of gas of lower calorific value and a weaker coke than the more favoured gas coals. It was thought, however, that, if it could be shown that the coal would behave with satisfactory uniformity when carbonized, it would compete with other gas coals, particularly where accessibility made it compare favourably in price."

The Northumberland Yard seam is normally used as a house and steam coal, but in certain districts it possesses rather better coking properties than in others, and has to some extent been sold for gas-making purposes. A consignment of this coal was therefore obtained and subjected to a series of gas-making tests in the Fuel Research Station setting of continuous vertical retorts (Glover-West) and in the setting of horizontal retorts. For purposes of comparison, similar tests were carried out upon Mitchell Main Gas nuts, which was chosen as being representative of the usual accepted range of high-class gas coals.

In the vertical retorts a preliminary series of tests was necessary to establish the best conditions of carbonization for the Yard coal, and as a result a mean carbonization temperature of 1170° C., giving a gas calorific value of 480 B.Th.U. per c.ft., was adopted. The yields obtained under these conditions, calculated per ton of dry coal, are given here in comparison with those from Mitchell Main Gas coal carbonized under the most favourable conditions:

—	Yard.	Mitchell Main Gas.
Coke—		
Total made, cwt.	13·0	13·8
Breeze, cwt.	1·0	0·7
Gas—		
C.ft.	17,040	16,680
Therms	81·3	88·2
Tar (dry), galls.	17·5	10·1

During the tests particular attention was paid to certain points of practical importance. It was observed, for example, that the variations in the gas yield or gas calorific value were no greater than those occurring with a high-class gas coal, though, owing to the greater freedom of the charge to the passage of gases, there was a greater tendency to the inward leakage of air through the coke chamber doors, not only when they were open but also, if they were not tight fitting, when closed. Special attention would therefore have to be paid to keeping the coke chamber doors in good working order, otherwise the variation in the nitrogen content of the gas, and consequently in its calorific value, would be inconveniently large. It was also found that "holding up" of the charge in the vertical retorts was not more marked than with a strongly-coking gas coal, and that the variations in calorific value due to this cause were also not greater.

The coke obtained was smaller than that from Mitchell Main Gas nuts, but tests show it to be suitable for the purposes for which gas coke is normally employed. From the results of the tests in the continuous vertical retorts it is considered that coals of the Yard type could compete with those of the fine gas coals category, provided that a higher gas calorific value than 480 B.Th.U. per c.ft. was not required and that the price of the coal was relatively lower, to offset the disadvantage of its high moisture content.

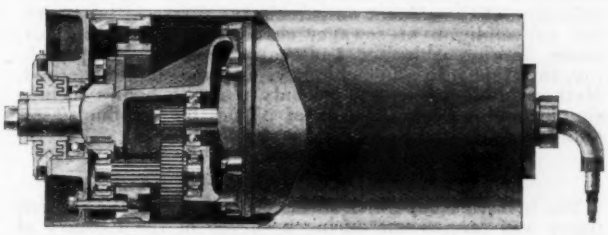
The results of the tests in the horizontal retorts confirm this opinion. Owing to the higher oxygen content, the gas obtained from the horizontal retorts was of rather low calorific value, being 522 B.Th.U. per c.ft. as compared with 593 B.Th.U. from Mitchell Main Gas coal. The thermal yield of 68 therms compares more favourably with the 76 therms obtained from the latter coal, and when calculated per ton of dry coal the comparison is even closer, being 76 and 77 therms respectively.

The general conclusion drawn from the results of a short test under low-temperature conditions is that Yard coal is suitable for the production of domestic smokeless fuel in retorts of the Fuel Research Station type. The semi-coke is fairly large and reasonably strong, though the tar yield is lower than that obtainable from the most suitable coals.

* Fuel Research Survey Paper 26: The Carbonization of Coal of Relatively Low Coking Power—The Northumberland Yard Seam. Published by H.M. Stationery Office; price, 9d. net.

Driving Drum for Belt Conveyors.

The Bamag patent driving drum for belt conveyors and similar equipment, in connection with both stationary apparatus and travelling loading belts, &c., claims the advantages that the weight is reduced, the arrangement simplified, and much smaller room occupied.



The motor, being totally enclosed inside the drum, is completely dust-tight and oil-tight, so that it can be used under the most dusty conditions. We understand that this driving drum has already been installed in over a hundred plants, some of which have now been working for six years without stoppage or any adjustment, and under the most dusty conditions.

The driving gear is of normal toothed construction and extremely simple. The gears are of special steel to ensure a long life, and all wheels run in an oil bath. All parts are readily accessible by the removal of two or three bolts, when the motor, gears, &c., can be withdrawn. Dismantling of this unit, however, is a most unusual occurrence.

COKE OVEN EFFLUENTS*

Investigation of their Toxicity

By Dr. B. A. Southgate

During the past few years a considerable amount of work has been done on the problem of the disposal of effluents arising during the carbonization of coal for the production of gas and coke. A review of the literature on this subject was published in 1927 by the Liquor Effluents Research Committee of the Institution of Gas Engineers, and since then the Committee has carried out further work with the object of reducing the quantity and the polluting character of the effluents and of improving the methods of disposal;[1] in addition, a large number of similar investigations have been undertaken abroad, particularly in Germany and America.

Most of this work has been directed towards the problem of treatment and disposal of effluents from gas and coke works employing the indirect process of ammonia recovery. In this process about 85% by volume of the effluent consists of spent liquor from the ammonia still, and about 15% of "devil liquor" from the heat exchangers and coolers which follow the saturator. The main constituents of still effluent and "devil liquor" are monohydric phenols, higher tar acids, sulphides, thiocyanates and thiosulphates. When discharged into streams, such effluents undergo oxidation at the expense of the dissolved oxygen of the water, and the deficiency of oxygen brought about may be so great as to render the water incapable of supporting fish life. In addition, the effluents are directly poisonous, the toxicity being mainly due to the phenols and higher tar acids they contain, and the water of relatively small streams into which they may be discharged may be rendered poisonous to fish and cattle.

Methods of Disposal.

The methods which have been proposed for facilitating the disposal of gas-works effluents have been of three main types:

(1) Methods designed to reduce the volume of spent liquor produced.

(2) Methods designed to modify its composition.

(3) Methods of purification or disposal of the spent liquor.

In general, the methods proposed for the reduction of the volume of effluent produced depend on a reduction in the volume of water used in the scrubbers. Modifications of gas-works practice designed to improve the quality of the effluent consist mainly of measures to minimize the oxidation of sulphides and cyanides to thiocyanates, which have a high de-oxygenating effect on a stream into which they may be discharged, and of modifications in the methods of removal of tar and liquor from the gas to reduce the quantity of tar acids dissolved by the liquor. The methods of treatment which have been proposed include the biological oxidation of the effluent on percolating filters with or without the addition of sewage, chemical oxidation by air, ozone, and hypochlorites, and evaporation by coke quenching, injection into a hot chimney, or some similar method. Methods designed to remove only phenolic bodies include simple boiling, volatilization of phenol by hot flue gases, and extraction with solvents or absorbents.

Survey of the River Tees.

The investigation which forms the subject of the present paper was carried out during a survey of the Estuary of the River Tees, made by the Marine Biological Association for the Water Pollution Research Section of the Department of Scientific and Industrial Research. The Estuary has, for some years, been heavily polluted, and the salmon and sea trout fishery, which was formerly very valuable, has become almost worthless. This decline has been due largely to the high annual mortality among the young fish or smolts, of which many thousands are killed during their spring migration from spawning grounds in the upper reaches of the river to the sea. The Estuary receives three main types of polluting material:

(1) Crude sewage from a population of about 275,000.

(2) Spent pickle liquor from galvanizing plants, consisting of a strong solution of acid ferrous chloride.

(3) Coke oven effluents.

Other types of substance discharged have been found to be of but minor importance. Owing to the oscillating movement of the water in the central part of the Estuary, polluting material does not immediately run out to sea, but may remain in the Estuary for some days, during which it undergoes biological oxidation. The water in the central part of the Estuary is thus partially de-oxygenated, the extent of this de-oxygenation increasing with a rise in water temperature. During a hot summer (water temperature 20° C.) the concentration may fall as low as 5% of the saturation value. Water de-oxygenated to this extent would be an impassable barrier to fish attempting to migrate through the Estuary. During April, May, and June, however, when the migration of young salmon and sea trout takes place, the water temperature is usually comparatively low and the dissolved oxygen value relatively high. In 1930 and 1931, during part of the migration period, the water of the central zone of the Estuary contained dissolved oxygen to the extent of not less than 70% of the saturation value, yet large numbers of fish were found to be dying in this water. Now rainbow trout, the resistance of which is similar to that of salmon or sea trout smolts, have been kept in a healthy condition in the laboratory for some days in water having an oxygen concentration much lower than this value, so that it appeared that the deaths observed in the Estuary were probably due to direct poisoning.

Of the three main types of polluting substances discharged, sewage and galvanizing spent pickle liquor have been shown to have no directly toxic action in dilutions of the same order as occur in the Estuary, and attention was therefore directed to an examination of the third type of waste liquors—namely, those discharged from the coke oven plants.

The coke ovens on the banks of the Tees Estuary employ either the direct or the semi-direct methods of ammonia recovery. At the time when the work described was carried out there were in operation three semi-direct and two direct plants. The effluents produced are:

(1) Spent still liquors from the semi-direct process.

(2) Effluents from coolers following the saturator in both the direct and semi-direct processes.

Before describing the composition of these types of effluent it is necessary briefly to outline the two methods of ammonia recovery in use.

In the direct method as adopted at the coke ovens on the banks of the Tees Estuary, the crude gas passes through a tar extractor where tar is removed at a temperature of 65° to 70° C., the hot gas then passing through a saturator in which the ammonia is recovered as ammonium sulphate. The gas, leaving the saturator at a temperature of about 70° C., is cooled before passing to the benzole recovery plant. In the plants under consideration this cooling is effected by direct contact of the gas with a large volume of water pumped from the Estuary and sprayed into the gas in a series of tall, unpacked cooling towers. The effluent contains soluble material washed from the gas, together with a suspension of naphthalene mixed with oil. Part of the naphthalene is removed at the base of the cooling towers and part in a settling tank through which the effluent flows before being discharged into the Estuary. The volume of effluent produced varies from about 600 to

* Paper before the Northern Section of the Coke Oven Managers' Association, April 6.

1 "Gas Journal" (1927), **179**, p. 101; (1928), **182**, p. 1016; (1929), **186**, p. 783; (1929), **188**, Supp. p. 55; (1930), **192**, p. 730; (1931), **196**, No. 3571, Supp. p. 14, and No. 3573, p. 409; (1932), **200**, Oct. 26, Supp. p. 11, and **200**, pp. 425 and 687; Trans. Inst. Gas Eng. (1927-28), pp. 330 and 370; (1928-29), p. 256.

900 gallons per minute, equivalent to 1000 to 1400 gallons per ton of coal carbonized.

In those coke oven installations on the banks of the Tees Estuary in which the semi-direct process of ammonia recovery is employed, the gas leaving the coke ovens is cooled in water cooled condensers to about 25° C., when liquor and tar (the tar containing naphthalene in solution) separate out. The liquor is separated from the tar and distilled with lime; the distillation gases are then mixed with the coke oven gas leaving the tar extractor, and are passed through a saturator for the recovery of ammonia. The spent liquor from the ammonia still constitutes one of the effluents of this type of process, and is discharged without further treatment into the Estuary, except in one plant in which it is used for coke quenching. The volume of still effluent is stated to be from 45 to 50 gallons per ton of coal carbonized.

After leaving the saturator, at a temperature of about 70° C., the gas is cooled, as in the direct process, before benzole recovery. In two plants the cooling is effected in indirect condensers, in which case the condensate is mixed with the ammonia liquor before distillation and no further effluent is produced. In a third plant cooling is carried out by direct contact of the gas with Estuary water in a series of packed towers, the effluent, after the removal of naphthalene, being discharged into the Estuary. The composition of this effluent is approximately the same as that produced in the corresponding cooling system of the direct process.

Examination of Spent Still Liquors (Semi-Direct Process).

The analysis of samples of two effluents showed that they had the following approximate composition:

	Parts per 100,000.
Alkalinity as CaO	170 to 200
Thiocyanate as CNS	10 to 11
Thiosulphate as S	23 to 27
Cyanide	*Nil*
Sulphur as H_2S	Trace
Monohydric phenols as phenols	163 to 184
Total tar acids	200 to 250

The nature of the toxic constituents was determined by observing the toxicity of various fractions of the effluent to small fish, rainbow trout usually being employed. The untreated effluent was highly toxic in ½% solution, causing trout to overturn in a helpless condition in a few minutes. When the effluent was distilled in neutral solution, the distillate was approximately as toxic as the undistilled effluent in the same concentration. The constituents were separated into the main groups of basic *plus* neutral and acid *plus* neutral substances by distillation from alkaline and acid solutions. The basic *plus* neutral group was found to be relatively innocuous while the distillate from acid solution was as toxic as the original effluent. A series of solutions of pure substances was then made up, each containing one constituent in the concentration found by analysis in the effluent. A solution of phenol or *p*-cresol was found to have approximately the same toxicity as that of the complete effluent, while solutions of the other constituents were innocuous under the same conditions. It was concluded, therefore, that the tar acids group of substances was mainly responsible for the toxicity of spent still liquor.

Examination of Effluents from Gas Coolers.

The composition of these effluents varies rather widely, partly due to the fluctuating volume of water used in the cooling towers, and partly due to variations in the efficiency of the ammonia saturator. The following is an analysis of a sample from one plant:

	Parts per 100,000.
Alkalinity as CaO	14
Thiocyanate	*Nil*
Thiosulphate as S	7
Cyanide as HCN	4
Sulphur as H_2S	7·7
Total tar acids	12·5

The concentration of cyanide in this effluent was lower than that usually found in samples from other plants in the Tees area, in which the mean value of a number of samples was 7·8 parts per 100,000, with a maximum of 9 parts per 100,000. The concentrations of cyanide (CN) and of tar acids in an effluent from a particular plant do not vary greatly, but wide fluctuations in the alkalinity accompanied by corresponding changes in the H_2S content occur, due to variations in the working efficiency of the saturator; the H_2S content may rise as high as 20 parts per 100,000.

These effluents are very toxic to fish, causing trout to overturn in a few minutes at a dilution of 1 in 200. This distillate from neutral solution is approximately as toxic as the undistilled effluent. A series of distillations similar to those described for spent still liquors showed that the substance mainly responsible for the toxicity was contained in the acidic group of constituents. When the toxicity of a series of solutions containing each of the main constituents in turn was determined, it was found that the toxicity of a solution of potassium cyanide of the strength equivalent to the cyanide in the effluent was approximately equal to that of the effluent itself. When the cyanide was removed from the effluent by precipitation as silver cyanide followed by the removal of excess silver as silver chloride by precipitation with sodium chloride, the effluent diluted 100 times was innocuous to trout. Another method of removing the cyanide consisted in treating the effluent with a small quantity of formaldehyde, with which cyanide combines to form the relatively non-toxic cyanhydrin; and again, after this treatment it was found that the effluent in a dilution of 1:100 was not toxic. It was shown that formaldehyde does not affect the toxicity of any other constituent of the effluent.

Chief Poisonous Substances.

As the result of this work it appeared that the main directly poisonous substances being discharged into the Estuary consisted of tar acids, contained mainly in spent still liquors and to a much smaller extent in effluents from coke oven gas coolers, and cyanides, contained almost entirely in effluents from coolers. The total quantity of these substances discharged per 24 hours during the period of the investigation was, very approximately, 800 kilogrammes of cyanide (CN) and 1600 kilogrammes of tar acids. The toxicity of cyanide is very much greater than that of tar acids. Thus, taking *p*-cresol as representative of the phenolic group, trout do not overturn in 1 hour in a solution containing 0·5 gramme *p*-cresol per 100 litres at a temperature of 5° C., but are rendered helpless in less than 1 hour at the same temperature in a solution of KCN equivalent to a concentration of 0·014 gramme CN per 100 litres.

During the spring of 1931, when salmon and sea trout smolts were migrating seawards through the Estuary, a survey was carried out and the relative importance of the factors, oxygen deficiency, tar acids and cyanides in the Estuary water was assessed. Over 5000 young fish were found dead on the Estuary banks, and large numbers dying on the surface of the water were taken by seagulls. Samples of water were taken daily throughout the length of the Estuary where fish were dying. The dissolved oxygen content of the water varied between 40% and 70% of the saturation value, and laboratory experiments have shown that it was not sufficiently low to have been responsible for the mortality. The concentrations of tar acids, estimated by the colorimetric method of Fox and Gauge, were generally of the order of 0·01 to 0·03 parts per 100,000, the maximum observed value being 0·05. These values are much lower than the minimum concentration of tar acids toxic to trout. During the survey, duplicate samples of Estuary water, each of a volume of 20 litres, were collected on 283 occasions. To one sample of each pair was added a small quantity of formaldehyde to remove as cyanhydrin any cyanide present, the other sample being untreated, and the time taken by a trout to overturn in each was observed. The results of these toxicity determinations are shown in the following list:

Non-toxic untreated Non-toxic with formaldehyde	140	samples
Toxic untreated Non-toxic with formaldehyde	130	,,
Non-toxic untreated Toxic with formaldehyde	5	,,
Toxic untreated Toxic with formaldehyde	8	,,

Of the 283 pairs, 138 (49%) were toxic to trout, and of these, the toxicity of 130 (94%) was removed when the cyanide was destroyed by the addition of formaldehyde. It is probable that in some at least of the remaining 8 cases the fish were killed by an overdose of formaldehyde, for it will be noticed that 5 samples out of 145 which were originally non-toxic were similarly rendered poisonous by the addition of formaldehyde. A direct confirmation of the presence of cyanides in toxic samples were furnished by chemical analyses which showed that the toxicity of a sample was directly related to its cyanide content. The relation between the concentration of cyanide found by

analysis and the occurrence of toxicity is shown in the following table:

Concentration of Cyanide. Grams (CN) per 100,000 Ml.	No. of Samples.	No. of Toxic Samples.
		%
0	84	13
0·002	37	19
0·003—0·004	45	62
0·005—0·006	32	84
0·007—0·008	15	93
0·009—0·010	12	100
> 0·01	23	100

It should be explained that the methods of cyanide determination available give low results when used with complex solutions such as Tees Estuary water, and that the values of cyanide concentrations given can be considered as comparative only.

In addition to the chemical and toxicity tests an examination of the fish found dying in the Estuary was made, and it was found that their blood was in the highly oxygenated condition characteristic of cyanide poisoning.

Cyanide the Chief Offender.

It was concluded, therefore, that the factor mainly responsible for the death of salmon and sea trout smolts in the Tees Estuary in 1930 and 1931 was the cyanide discharged into it as a constituent of effluents from gas coolers of coke oven installations. To avoid the discharge of these effluents it would be necessary to modify the existing plant, probably either by substituting indirect for direct cooling of the gas leaving the ammonia saturator, or, if direct cooling were retained, by cooling and re-circulating the water supplied to the scrubbers. It was hoped, however, that it might be possible to evolve a method which would not necessitate extensive alterations of plant, and which could be used temporarily during the period of a smolt migration. The effect of cyanide removal on the toxicity of the Estuary waters could then have been studied on a large scale.

The first method investigated depended on the interaction of ferrous chloride with cyanide to form ferrocyanide, a relatively non-toxic substance. The ferrous chloride for this process is available locally as spent pickle liquor resulting from the cleaning of steel in hydrochloric acid before galvanizing. A considerable quantity of the spent pickle liquor, consisting of a solution containing about 40% ferrous chloride and 2 to 4% of free acid, is discharged into the Estuary and is available for the cost of collection. In preliminary experiments it was found that pure solutions of cyanides, in the concentrations in which they occur in the effluents to be treated, could be converted to ferrocyanides, almost quantitatively, by ferrous chloride. In treating effluents, it was found that their H_2S content, the concentration of which varied from 2 to 20 parts per 100,000, interfered considerably with ferrocyanide formation. Part of the ferrous chloride added is precipitated as ferrous sulphide, which then reacts with the cyanide, though very much more slowly than does the soluble ferrous chloride. The precipitate of ferrous sulphide rapidly settles out, and in order that its interaction with cyanide may proceed it is necessary to stir the effluent continuously during treatment. In most of the laboratory experiments the effluent was stirred mechanically, but in a few cases the precipitate of FeS was kept in suspension by a stream of air. This treatment increased the rate of disappearance of cyanide to a greater extent than could be accounted for by its purely mechanical effect. In some cases æration of an effluent for about 4 hours at 30° C. without the addition of any ferrous chloride removed the cyanide. It is possible that under these conditions the cyanide is volatilized, or that the H_2S present is oxidized, giving free sulphur which reacts with the cyanide to form thiocyanate. No diminution in the toxicity of an untreated effluent was brought about by purely mechanical agitation of 30° C.

The rate of conversion of cyanide to ferrocyanide was found to be accelerated by increasing the alkalinity of the solution. Thus, an effluent which required a period of treatment of 4 hours with a given concentration of $FeCl_2$ in order to render it innocuous to fish in 1% solution required only 1 to 2 hours under the same conditions when 15 grammes of lime per 100 litres of effluent were added. The rate of purification is increased by increasing either the concentration of ferrous chloride or of lime. For the effluents examined the actual length of the reaction period depended almost entirely on the concentration of H_2S present; thus three samples of effluent containing 3·3, 4·9, and 10·4 parts of H_2S per 100,000 required periods of treatment of $\frac{1}{4}$, $1\frac{1}{4}$, and $3\frac{1}{4}$ hours respectively for the same amount of purification, when treated with a given quantity of lime and spent pickle liquor. From the laboratory experiments it appeared that it should be possible to treat successfully a gas washing effluent by mixing with it for $\frac{1}{4}$ hour 30 parts CaO and 13 parts $FeCl_2$ per 100,000 parts of effluent, provided the H_2S content did not exceed about 4 parts per 100,000.

Large-Scale Tests.

By the courtesy of Messrs. Dorman, Long, & Co., Ltd., a series of large scale tests of the treatment with pickle liquor of coke oven effluent containing cyanide was carried out at the Newport Ironworks. The effluent from the gas coolers passes through two settling tanks, arranged in parallel and fitted with baffles, where it deposits naphthalene and some light oil before being discharged into the Estuary. The main bulk of the effluent was allowed to pass through one of these tanks, the fraction to be treated being diverted to the second tank. The flow was regulated by a valve and measured by a V-notch at the outlet. A suspension of lime was run into the experimental tank from a mixing vessel, the contents of which were agitated by compressed air. A proportion of the effluent from the outlet of the settling tank was pumped continuously into the lime mixing vessel, slaked lime being added intermittently by hand. The rate of admission of milk of lime to the reaction tank was kept as nearly as possible at a constant value. Spent pickle liquor was run in from an inverted carboy, the flow being measured and regulated from time to time. The effluent and suspension of ferrous sulphide was mixed continuously by hand, some additional mixing being provided by a pump which circulated effluent from one end of the tank to the other. Approximately 80 gallons of effluent per minute were treated, this representing about one-tenth of the total supply. The concentrations of lime and pickle liquor added were:

Lime: 3 lbs. per 1000 galls. [30 parts per 100,000].
Pickle liquor (containing 40% $FeCl_2$, specific gravity 1·38): 0·025% by volume [13·8 parts $FeCl_2$ per 100,000].

A period of contact of about one hour was given, the capacity of the lime mixer and design of the settling tanks making it impossible to experiment with shorter contact periods. Samples of outflowing treated effluent were taken at hourly intervals and the toxicity to trout of 1% solutions was compared with the toxicity of the untreated effluent under similar conditions. When conditions had become steady, the treated effluent was found to be innocuous to trout in 1% solutions over periods of 25 hours, corresponding solutions of the untreated effluent being toxic in a few minutes.

A second method of removing cyanide from effluents was investigated. This consisted in spraying the heated liquor into the air as a fine mist. In laboratory experiments almost complete removal of cyanide was obtained when liquor containing approximately 4 parts CN per 100,000 was heated to 50° C., forced through a jet, and allowed to impinge on a spherical baffle where it broke up into a fine spray. A large-scale test of this method was then tried at the Newport Ironworks, where facilities were again provided by Messrs. Dorman, Long, & Co., Ltd. The flow of effluent through one of the naphthalene settling tanks was stopped, and the liquor in this compartment was heated by steam. A small rotary pump was used to spray the heated effluent through an atomizer of the type used in the direct cooling towers of the ammonia recovery plant, samples of the sprayed liquor being collected for toxicity tests with trout. It was found that a substantial reduction in the cyanide content occurred when the liquor was sprayed at 58° C., the toxicity to trout being reduced to about $\frac{1}{10}$th of its original value.

Unfortunately, it was found impossible to apply either of the methods investigated to the whole of the cyanide-containing effluents entering the Estuary during the salmon migration season of 1932. The chief difficulty in dealing with these discharges is the very large volume of effluent to be treated. Any modification in works practice which would reduce the volume would add materially to the chances of devising a successful large-scale method of treatment.

I am greatly indebted to Messrs. Dorman, Long, & Co., Ltd., Imperial Chemical Industries, Ltd., the Cargo Fleet Iron Company, Ltd., and to the numerous firms and local authorities whose co-operation has made the work described in this paper possible.

The investigation was carried out as part of the programme of the Water Pollution Research Board, and this paper is published by permission of the Department of Scientific and Industrial Research.

Recovery of Sulphur from Spent Oxide

[CONTRIBUTED.]

The removal of hydrogen sulphide from coal gas has generally been regarded as a process in which the cost is largely covered by the revenue from the products obtained. Under present conditions, however, there is a tendency for the price of the new purifying material to increase, while the value of the spent oxide has fallen considerably. Attention is therefore focussed upon reducing the cost of the new oxide and augmenting the value of the spent material. At present the majority of the spent oxide is used for the manufacture of sulphuric acid, in which process it is heated to a relatively high temperature, with the result that the burnt residue of iron oxide remaining is practically useless as a purifying material. The effect of the heating is to decompose the hydrates of iron originally present, and, although many attempts have been made to regenerate the burnt material, no successful method has yet been devised. Thus the value of spent oxide is solely dependent upon the sulphur which it contains. If, however, the sulphur can be extracted from the oxide in a reasonably pure condition without subjecting the oxide to a high temperature, several possibilities become available:

(1) Sulphur in a fairly pure form commands a price very much higher than when present in spent oxide.
(2) The residual oxide retains some of its original properties of hydrogen sulphide absorption, and therefore may be used again as a purifying material.
(3) Spent oxide contains a varying quantity of prussian blue, but in many cases the percentage is too low to justify extraction. If, on sulphur extraction, this material is left in the residue, it would increase in concentration each time the oxide is re-fouled until it is sufficiently high to justify extraction. The value of this spent material will be appreciably greater than that of the ordinary, once fouled, oxide.

From the above considerations it will be apparent that a process by means of which the sulphur can be extracted from the oxide and obtained in a reasonably pure condition without excessive heating has much to recommend it, and considerable attention is now being given to this problem. The most obvious method of treatment is to dissolve out the sulphur with solvents. On evaporation of the solution, crystals of sulphur are obtained, but these are contaminated with the tar originally present in the oxide, and their value is consequently lowered. Various selective solvents have been tried in the hope of preferentially extracting the sulphur, but, although it is possible to extract the majority of the tar without the sulphur, the converse has not been achieved. Benzene, for example, will dissolve the majority of the tar at air temperature, leaving the sulphur in the oxide. The choice of solvents is further limited to those which can easily be removed from the oxide, which implies a liquid of relatively low boiling point. Further, in order to obviate the use of large quantities of solvent, the solubility of sulphur in the solvent should be as high as possible. The solubility in most solvents increases rapidly with the temperature, and proposals have been made to work at high temperatures and to recover the sulphur by crystallization on cooling. The best solvent for sulphur is, undoubtedly, carbon disulphide, but this possesses two disadvantages, the first being its volatility and liability to combustion and explosion, and the second the fact that the sulphur is obtained contaminated with tar. Various methods have been proposed for the removal of the tar from the crude sulphur, such as treatment with concentrated sulphuric acid, but all possess the disadvantage of being complicated and correspondingly costly to operate.

Attempts have been made to remove the sulphur by passage of steam and inert gases through the oxide, the sulphur being volatilized and recovered from the gases by cooling. Such methods are limited by the fact that at temperatures above 250° C. the oxide of iron becomes partly dehydrated and loses its activity. The tar is volatilized along with the sulphur, but by fractional condensation a fairly pure sulphur may be obtained. The use of inert gases in this way has the advantage of simplicity, but it does not appear to have been adopted for large-scale work, and at the moment the only methods in use are those involving the solution of the sulphur in carbon disulphide. Obviously, treatment of spent oxide in this way can only be carried out by a large gas-works or a centrally situated chemical works. Two plants have recently been erected in Germany, one by the Ruhr A.G., which is capable of producing 6000 tons of sulphur per annum, and the other by the Thyssen Gas and Water Company, with a capacity of 2000 tons of sulphur per annum. In each case the sulphur is extracted from the spent oxide by carbon disulphide.

For the commercial success of sulphur extraction it is essential that the spent oxide residue should be salable as purifying material and that a higher price be obtained for the sulphur than when present in the form of spent oxide. In the Ruhr plant the crude extracted sulphur is stated to contain 95% to 99% sulphur. The crude sulphur thus obtained is treated to yield a product of practically pure sulphur, while the residual oxide, after activation, is then returned to the purifiers for further use. It is stated that this material has been in use in boxes of 150 tons capacity and has given results equivalent to those obtained with fresh oxide. In this way the content of prussian blue in the spent oxide is increased, and after the material has been extracted three or four times it may conveniently be disposed of for the extraction of the prussian blue content. It will thus be seen that, assuming a market is available for the pure sulphur and that the extracted oxide may be re-charged to the boxes without loss of efficiency as a purifying material, the extraction process has considerable potentialities.

VALUE OF EXTRACTED OXIDE AS A PURIFYING MATERIAL.

The activity or rate of sulphur absorption of spent oxide is usually very low, due largely to the coating of the surface of the iron oxide with sulphur and tar which prevent the access of H_2S to the material. On removal of the sulphur and associated tar the original activity should be restored, but actually this is not always the case. The value of an oxide for gas purification is constituted by several factors—viz., the percentage of active iron, the rate of sulphidation, and the rate of revivification. The value of the oxide residue after sulphur extraction has been examined by Broche[1] and his collaborators, who have tested the oxide from two aspects—viz.,

(1) The quantity of sulphur absorbed (per unit weight of oxide) when the oxide is completely fouled.
(2) The rate of absorption of H_2S as measured by the volume of crude gas passed through the oxide before H_2S ceases to be absorbed.

Typical results obtained by method (1) are shown in the following table, the oxide being fouled and regenerated ten times:

Oxide.	% Sulphur Absorbed (10 Foulings).	% Sulphur Absorbed after Activation.
Natural oxide	42·3	..
Lux and natural oxide (50 : 50)	57·0	..
Residual oxide after sulphur extraction—		
I.	36·3	45·5
II.	36·2	45·0
III.	44·1	47·4

It will be noted that the quantity of sulphur absorbed by the extracted material is not appreciably lower than in the case of the original oxide, and from this standpoint the material is equivalent in value to the new oxide. When examined by the second method, however, a rather different picture is revealed—*i.e.*,

Oxide.	Rate of Gas Flow (Ft./Min.).	Activity (C.Ft. of Gas/Gramme of Oxide).
Natural oxide	1·38	1·47
	5·50	0·50
Lux	5·50	1·17
Extracted oxide	5·50	0·07–0·14
Activated extracted oxide	1·38	2·06
	5·50	0·51

At a rate of flow of 5·5 ft. per minute, hydrogen sulphide appears in the case of the extracted oxide after 0·1 c.ft. of gas has been passed, as compared with 1·17 c.ft. for the Lux and 0·50 c.ft. for natural oxide. It was found that improvement could be effected by adding small quantities (2-3%) of $CaCO_3$, soda, &c., a value of 0·51 c.ft. per gramme then being obtained. Comparative experiments, at a much lower rate of flow (*i.e.*, 1·38 ft./minute), showed, however, that under these conditions this activated material was superior in activity to natural oxide. The possibilities, therefore, of using the activated material would appear to be determined very largely by the design and capacity of the purifying plant, and the use of the regenerated material

[1] Brennstoffe Chemie, 1932, 11, p. 201.

in plants in which the rate of flow of the gas is of the order of 1·5 ft. per minute. While this is a serious limitation, there are many works where an oxide of the above activity could be efficiently utilized.

Having examined the technical aspect of the process, the question arises as to the working costs and the revenue which is obtainable from the products. From a ton of bog-ore there is produced, say, 1·4 tons of spent oxide containing 15% water, which on extraction yields 0·7 ton of sulphur and 0·7 ton of oxide residue. When the moisture content of the latter is increased to that present in the original oxide (*i.e.*, 40%) a weight of 1·05 tons is obtained.

Assuming the new oxide to cost 30s. per ton and the value of the spent material to be 12s. 6d. per ton, the net cost, under ordinary conditions, is equal to 12s. 6d. per ton of oxide or about 0·016d. per therm. If, however, sulphur be recovered from the spent oxide an appreciable reduction in this figure should be realized, since the cost of new oxide may be considerably reduced by replacement with the residue left after sulphur extraction. This process cannot continue indefinitely owing to the accumulation of cyanogen, &c., compounds in the residue, and hence the extracted oxide must be removed from time to time and replaced by new material. The cost of sulphur extraction should be covered by the revenue from the sulphur which is extracted, if suitable markets for this material can be obtained.

Morris-Commercial "Fours" or "Sixes"

Big Range of New Twin-Top Vehicles

We have already announced the attractive range of six new six-cylinder commercial models introduced by Messrs. Morris Commercial Cars, Ltd., and now we are able to inform our readers that the same manufacturers can offer similar models with four-cylinder engines for those transport users who have a decided preference for this type of power unit. The choice of alternative power units is a novel feature which will be appreciated by the motor trader as well as the actual user himself. This innovation does not in any way entail a multiplicity of models with the attendant servicing complications, for the reason that, except for the actual unit itself, the chassis remain entirely unchanged. Allied to that, the percentage of parts which are interchangeable throughout the whole range of 30-cwt., 2-ton, and 3-ton models is very high. This simplifies standardization when vehicles of varying capacities are employed.

Entirely New Design.

The new four-cylinder unit has a bore of 100 mm. with a stroke of 112 mm., the R.A.C. rating being 24·8 h.p., while it develops 55 B.H.P. It is a good, hard slogging unit, possessing adequate power and producing heavy torque at low engine speeds, thus ensuring long life and economy in operation.

Special attention has been paid to valve efficiency, the valves themselves being of one-piece type in heat-resisting silchrome steel, side by side location, while the maximum cooling areas have been arranged round the valves, which ensures even temperature at all speeds.

The power unit is mounted at three points on rubber blocks, which gives freedom from distortion when travelling over uneven roads. Another interesting feature is that the chassis frame is doubly strengthened at the points where the greatest stresses are imposed. Special triangulated sub-frame bracing is carried forward inside the main frame almost up to the front dumb irons.

Driving Comfort.

With the introduction of these new models Morris Commercial Cars, Ltd., have established a new standard in commercial vehicle efficiency. They have embodied many features which are looked upon as exclusive pleasure car requirements. They recognize that to look after the driver as well as the load and make driving easier means more productive effort and all-round satisfaction. For instance, all the models are fitted with twin-top gearboxes embodying a "silent third" of constant mesh double helical gears and dog engagement system. The traffic "third" or twin top gear enables the driver to maintain good speed when negotiating traffic or long hills, and there is no gear noise, in fact it is difficult to tell by ear whether the vehicle is in top or third. In addition, there is a very low first gear for emergency use, enabling the driver to tackle rough ground or gradients as steep as 1 in 3.

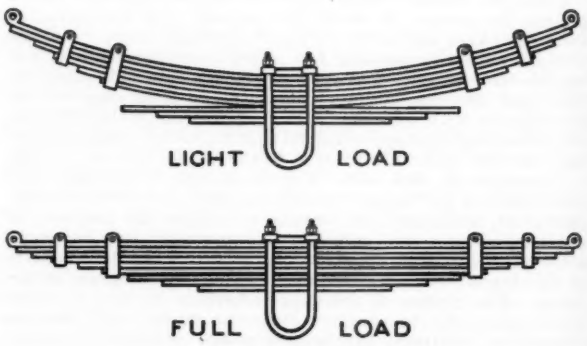
While the vehicle will climb any hill in remarkable fashion, it will also descend very steep gradients with the maximum of safety on account of the adequacy of the braking system. The four wheel brakes have internal expanding shoes and are operated by the well-known Lockheed hydraulic brake system which ensures safe stopping with permanently equalized application of power simultaneously to all wheels. The hand brake operates on rear drums only by means of cables, and the drums are the maximum diameter.

The speedometer gear is driven from the rear of the gear-box.

Another new departure is the all-steel cab on the normal control models, which represents the most advanced method of construction and provides comfort and safety for the driver. High grade, well-sprung upholstery for seat and back-rest; full width doors; winding windows; safety glass windscreen and rear observation window; automatic screen wiper and conveniently placed driver's dispatch box. All models are equipped with finger-tip controls, electric direction indicator, dipping beam headlamps, and 12-volt lighting and starting sets.

Protecting the Load.

Attempts have, in the past, been made to provide an adjustment to car springs to vary the tension according to the number of persons carried; such inventions invariably necessitated objectionable hand adjustment at the dirtiest part of the car. Messrs. Morris Commercial Cars, Ltd., have solved the problem in the most practicable manner



The "Progressive Spring."

with what is known as the "Progressive Spring" (see illustration), which automatically strengthens itself as the load is increased. Auxiliary leaves underneath the main spring come into action in accordance with varying loads, so that fragile loads are protected from road shocks just as much as heavy loads, in fact this type of spring adjusts itself to any load, and it requires no attention beyond the usual greasing between the leaves.

Easy Maintenance.

Morris Commercial vehicles are noted for their straightforward design calling for the minimum of maintenance work. The Morris-Commercial engineers have made even greater improvements in this respect, and an examination of the new chassis makes it abundantly clear that they have first put themselves in the place of the owner and maintenance man and then added every conceivable device to reduce maintenance costs. For instance, the Lockheed hydraulic braking system eliminates all brake rod mechanism and its attendant oiling duties. The clutch requires no internal adjustment or lubrication, and all inaccessible parts requiring lubrication are connected by oil pipe to a group of oil gun nipples at convenient positions on the chassis.

It is apparent that transport operators appreciate the many good points embodied in these vehicles by the fact that an enormous number of orders have been placed with the manufacturers.

Catalogues illustrating the many advanced features of design can be obtained from Messrs. Morris Commercial Cars, Ltd., Adderley Park, Birmingham 8.

THE "JOURNAL" TECHNICAL RECORD

Which contains Reports of Meetings of Gas and Allied Associations

Uses for Gas in Industry*

By G. D. Morton (Industrial Representative, Manchester Corporation Gas Department)

I think it is accurate to say that the policy of gas undertakings is to furnish a supply of gas at the cheapest possible price consistent with the maintenance of efficient plant *plus* a surplus to meet capital charges and the provision of reserves. I know that many undertakings are finding it difficult to carry out these desires in entirety, but they have to be constantly borne in mind.

There is not much scope for general reductions in the price of gas, and executive chiefs have to look around for some other means of creating expansion in sales and preferential terms for certain purposes and quantities, &c., are usually offered.

By a two-part tariff it is possible so to adjust a fixed charge as to recover the definite costs of giving the service but encouraging the increased use of gas by simply charging its manufacturing cost as a commodity charge. In meeting the competition from oil the two-part tariff seems to me to be a most essential adjunct. Oil prices vary very little at any point in the country, and the margin between the price for medium quantities and large quantities is not very wide. The reverse is the case with gas.

With one exception not one turnover from gas to oil has been made in Manchester. The business has been retained mainly through the instrumentality of the two-part tariff. Since this was instituted the largest consumer to adopt it has increased the consumption from 39 to 53 million c.ft. per annum. Had no elasticity been introduced in the method of charge, we should have lost even that which we had.

Design of Furnaces.

To obtain efficiency it is necessary not only to have burners of the most suitable type to ensure perfect mixing of the gas and air, but to pay due regard to the insulation of the apparatus. Furnaces of the older type generally had refractory walls from 3 in. to 4½ in. thick, through which the heat from the chamber readily passed. Because of this fault the losses from radiation and convection were enormous. In addition, similar losses were due to poor insulation at the doors. To retain the maximum heat it is necessary to have walls considerably thicker than 4½ in. In fact, 9-in. firebrick backed up with 3 in. of best-quality insulating material is none too much. The doors should be similarly treated. In many older type furnaces the flue outlet was situated directly on the chamber top, and the retention of the heat in the chamber was dependent on the adjustment of the damper. This type of flue outlet passed the gases at practically the same heat as in the chamber. This was obviously a great mistake, as all flue gases should be taken out in such a way as will tend to increase economy. To do this, the products of combustion should be more fully utilized in pre-heating all secondary air or, in the case of a pressure furnace, pre-heating the primary air before it eventually mixes with the gas. I remember a firm in the south which used the flue gases by taking them directly through suitably constructed water tanks. This arrangement enabled the firm to supply hot water to many points in the factory for the use of workpeople at no cost whatever except for piping and taps. I would not go to the length of stating that the products should leave the flues without any heat whatever. It is necessary to have some heat left in them, otherwise artificial means would have to be employed to remove them.

Modern high efficiency furnaces when on continuous work enable carburizing work to be done at the rate of just under 2 c.ft. of gas per lb. of charge when the duration of treatment is about 10 hours, temperature about 920° C., and the depth of case 1-32 in. Best results are undoubtedly obtainable on furnaces fitted with automatic control gear. Gas furnaces for forging, &c., are now in use running up to 40% efficiency.

Gas in New Trades and Processes.

Extensions in the uses of gas are taking place and new firms have come into existence for the manufacture of such products as wireless components which call for gas for heating platens for bakelite manufacture, &c. A number of hydraulic presses supplied for this work are fitted with platens which are unsuitable for the economical and efficient use of gas. This is due to the contracted space allowed where the burners are fitted. In many instances there is not sufficient room for anything like complete combustion, and consequently there is delay in heating up, coupled with unsatisfactory working. In cases of this description I have advised the pre-mixing of gas and air in a suitable machine before delivery. Perfect combustion in the limited space is ensured and quicker heating is obtained, resulting in a reduced gas consumption. In my opinion pre-mixing should be more widely used.

Another firm uses gas on a fairly large scale for wax melting in the manufacture of school crayons. Yet another has called for gas for lead melting required in the engraving business. The pots heated have capacities of 10, 8, and 5 cwt. respectively, and there are also two gas-fired wax boilers, hotplates, and plating tank.

A firm of provision merchants who supply roast hams have installed a simple form of conveyor roaster approximately 6½ ft. in length. The hams are first steamed and then placed on trays and passed through the oven. There is accommodation for eight 14/16 lbs. hams, which can be heated up to 500° F. and be ready for taking out in 5 to 6 minutes. The hourly gas consumption is 195 c.ft., and the oven is fitted with a suitable thermostat.

Aeroplane Manufacture.

I have already drawn attention in a previous paper ("Gas Salesman," January, 1933) to a firm of aeroplane manufacturers who were interested in an oven which would accommodate the whole fuselage of an aeroplane. This oven has now been completed and measures internally 30 ft. long by 6 ft. wide by 10 ft. high. The oven is of sheet steel plates double cased and insulated between cases. Being built in sections the oven can readily be lengthened or shortened when necessary. The heating is by hot air taken from the firing box and injected into the oven by means of a fan. The hot air passes from the fan into chambers along both sides of the oven and then through suitable apertures into the oven. For heating up to 280° F. approximately 1 hour is required with a gas consumption of 1000 c.ft., and this temperature can be maintained on approximately 50% of this consumption. The waste products can either be let out into the atmosphere or returned to the firebox, which means a higher efficiency in the latter case. The oven is capable of accommodating at one time 2 fuselages and 6 wings weighing approximately 740 lbs., and stoving is completed in 2 hours. This system of stoving is undoubtedly more economical than purely heating the oven by gas. The oven is thermostatically controlled, and the difference in temperature in the 30 ft. length is only a matter of 5°. Correct adjustments have not yet been made, but it is hoped that when these are completed a smaller difference in temperatures at the ends may result.

Gas in Crematoria.

There is no doubt that gas is a more suitable fuel than either oil or coke for cremation work, and it can be used

* From a paper before the Manchester and District Junior Gas Association, April 1, 1933.

very economically. Two cremating ovens are in use in Manchester, and sufficient room is available for a third to be fixed.

In regard to the modern apparatus, the container, on leaving the catafalque passes into an intermediate chamber and is then placed on a carrier or trolley for conveyance to the incinerator; consequently no member of the cortege gets even a glimpse of what is beyond the intermediate chamber. The cremating furnace has been designed to meet all the requirements of the Burial Boards and other authorities who may desire to erect a crematorium. The design does not even call for the construction of special foundations or underground flues. It is a self-contained apparatus, the casing being of cast iron and steel with a lining of refractory material, and it should stand on a strong and level concrete floor. The chimney or outlet for the products of combustion is on the top, and being on the updraught principle a pilot fire to create a draught is unnecessary. The gas burners are of the natural-draught type, fixed on either side, efficient and simple to work, and requiring no air under pressure. This is an important point, as pressure air necessitates the use of machinery with its attendant noise—an objectionable feature in a place of this description. The burners project the flames into the lower or combustion chamber, the floor of the latter being made up of specially moulded perforated sections with suitable projections for carrying and also keeping the container slightly clear of the actual floor. The products rise from the combustion chamber, passing through the perforations, and in a short time the charge is being consumed. Above the main chamber a further chamber or box is constructed with burners at the sides which is only brought into use when there is a zinc lining in the container. This is seldom the case, but these burners when in operation dispel any objectionable odour which may arise through having this type of lining. The advantage of heating from the lower chamber is that an excess of hot air is passed upwards along with the products of combustion, in addition to the preheated air from the regenerator flues, thus dissolving the body into hot gases which carry little smoke or dust.

The present-day cremating furnace requires lighting only a short time before the container is placed in the chamber, and preheated air is soon available. The furnaces fixed in the Manchester area have a modified form of preheater for the secondary air, the combustion chamber itself supplying the necessary heat. This arrangement is quite efficient without being elaborate, or requiring a great amount of space.

A cremation now takes roughly about 1¼ hours to reduce everything to ashes, the second and third consecutive cremations taking approximately 1 hour each. It has been said that a cremation can be done in 1½ hours starting from cold, but this has not been tried out in Manchester. Usually the furnace is lighted up a quarter of an hour before the container is put in the chamber. Roughly 1500 c.ft. of gas is sufficient when only one cremation takes place, but this figure is reduced when there are others to follow immediately after.

The working costs are below those when solid fuel was in use. About 9 cwt. of fuel were required to heat up the furnace prior to work being commenced and to reduce one body. An additional 2 cwt. for each consecutive body was required.

When gas is used the ashes are much whiter than when solid fuel is used.

De-Metalling.

At present we are in negotiation with one of our largest consumers for a gas-fired oven furnace for de-metalling purposes. The parts to be de-metalled are axle boxes which are made of bronze and gunmetal, some of them weighing over 4 cwt. each. The bearings of the boxes (called journals) are lined with Babbitt metal, an alloy of tin, antimony, copper, and in some cases lead. After the boxes have been in use for a time the journals become rather worn, and it consequently becomes necessary to replace them. The boxes are placed in the furnace, and when the desired temperature is attained the lining metal runs out, afterwards being run into 12 or 14 lb. ingots. It is then returned to the original makers for refining purposes. Losses are made good by the refiners and re-sale as new is effected. Nothing is scrapped, for the boxes can be remelted. De-metalling can be done by solid or liquid fuel, but, since the temperature required is not high, gas is by far the best fuel for the purpose. This point was stressed to the management, who are now quite agreed. Two or perhaps three furnaces may be required for the work, each having a maximum consumption of approximately 500-600 c.ft. per hour. For the smaller brasses such as are required for coupling and connecting rods, &c., which are lined, a conveyor fired by gas may be considered at a later date. This consumer at present takes about 24 million c.ft. of gas yearly; and should this plant be accepted, at least a further million will be necessary.

The negotiations were commenced by a casual visit and a subsequent discussion on the various aspects of this particular work. I have also made several suggestions for the more efficient use of gas for other processes, and while I feel that there is every hope of their being adopted I am not yet in a position to give details.

I would add that the scheme put forward in this instance for the de-metalling and the other processes is on the pre-mix system.

Pre-Mixing of Gas and Air.

Reverting to the question of pre-mixing it is my firm opinion that this system should be more widely used than it is at present, because—

1. The machine or mixer is a piece of perfect engineering workmanship fitted with automatic control, and it practically eliminates human attention once it is set and put in operation.
2. It ensures a scientific mixture of the gas and air, thus making it possible to have a supply of fuel in the correct proportions necessary for perfect combustion.
3. Economy is ensured owing to the mixture being perfectly combustible and pressure being under control. A never varying flame is consequently applied, each B.Th.U. being certain to give its full energy.

This system can be fitted to most types of furnace, oven, &c.

I have already mentioned the heating of platens on presses for bakelite manufacturing but I should add that it is also adaptable for vulcanizing. This work is often done by means of steam, but where steam is generated by gas the pre-mix system can be substituted with probably better results, and more economically. To convert from steam to gas heating it is, of course, necessary to open out the steam chest walls to admit the burners and also to allow the products of combustion to escape.

For schreinering, calendering, singeing, &c., this is undoubtedly the most efficient way. I have seen schreinering and embossing rolls heated by gas which passed through a tube with the necessary perforations on the top for the flames, and in order to ensure combustion another tube was passed through the centre. By an electrically driven fan suction was caused which pulled both air and products from the rollers, which are open at the ends, and ejected them outside the shop. This is rather a crude and inefficient way compared with the pre-mixer.

Gassing is an important process in the cotton industry, and in this district many machines are in operation. This process entails the burning of loose fibres from the yarn by passing them through gas jets. The success of the process makes it necessary that the correct mixture of gas and air should be constantly available. Pre-mixing is definitely necessary for this work, and it is essential that charring or discolouring of the yarns be entirely eliminated, otherwise many yards of material may be scrapped. The length and heat of the flame are of great importance, and these are previously determined by experiment. Many determine the correct flame by a pilot light near the mixer, but others by the actual flame on the burners where the work has to be done. The latter method is, I think, preferable.

Each count or thickness of yarn requires a different flame, and when work is given out the pressure from the mixer is stated so that the man on the job adjusts accordingly. So long as the gas is consistent, trouble is never experienced, but where considerable fluctuations in calorific value take place adjustments are necessary to avoid wastage. Flame and heat are both necessary. The flames remove the loose fibres, as I have already explained, while the heat melts the oil in the core of the material, part of which comes to the surface, and in cooling gives a kind of mercerized finish. It also helps to strengthen the material. There are various ways in which the yarn may be discoloured. Burning is only one of them. There is the speed of travel, and this may be considerably altered by allowing too much wear on spool spindles. Spools being permitted to take on too much yarn slow down the speed, as they are usually driven by friction.

Discussion.

Mr. H. P. Lupton (President), opening the discussion, asked if the oil competition had only put in one oil apparatus, or did this refer to existing business only.

Mr. Morton replied that it referred principally to existing business.

Mr. J. Carr (Stretford) asked whether it was the author's experience that the price of gas must be less than that of oil, despite the advantages of gas.

Mr. Morton: Yes.

Mr. W. L. Heald (Preston) remarked that motor firms were

prepared to pay more for the heat treatment, as they could get more for the better finished article of various small parts. Gas heating being able to produce a much better finish, the cost was about 5d. for gas, as against 3¾d. for oil. As regards gold thread for uniforms, &c., the gas pressure on the apparatus was very important.

Mr. J. T. HAYNES (Rotherham) said that the block system operated against the small consumer. The large consumer was a drain at one point of the distribution system. A number of small consumers gave a more useful load on the system. It would thus seem that the small consumer should get his commodity at an equal rate to the large consumer. He stressed the point of the value of conversion of existing furnaces to gas rather than the installation of new furnaces in these hard times. The furnace should be designed for the particular job it had to do. Standard furnaces were not always applicable.

Mr. J. GRAHAM (Lancaster) moved, and Mr. A. K. COLLINGE (Preston) seconded, a vote of thanks to the author for his paper.

Scottish Junior Gas Association (Eastern District)

Visit to Kelty Gas-Works

On Saturday, April 1, members of the Scottish Junior Gas Association, Eastern District, visited the Works of the Kelty Gas Company, Ltd.

The party were met by Mr. D. Campbell, Manager, and his Staff, and were conducted over the plant. The gas-making plant consists of a bench of horizontal stop-ended retorts capable of producing 240,000 c.ft. of gas per 24 hours, together with two Tully complete gasification plants, each capable of producing 150,000 c.ft. per day; 37,000 c.ft. of 450 B.Th.U. gas being produced per ton of coal carbonized on the latter plant. The works are well equipped with modern auxiliary plant. The town is supplied with 450 B.Th.U. gas at 4·5 in. pressure, while a 6 in. high-pressure main conveys gas to the village of Lochore, 3½ miles distant.

Much interest was evinced in a display of acetylene cutting and welding given by a member of the distribution staff. The showroom is situated in the main thoroughfare and is well equipped with the latest gas apparatus.

An opportunity was provided to inspect the Fife County Council Housing Scheme at Kelty. Gas switches are fitted in every room, and each house is provided with a gas wash-boiler and cooker.

The party were later entertained at tea by the Directors of the Gas Company. Mr. DAVID WARDEN, President, returned thanks for the welcome extended to the Juniors that afternoon.

Mr. IZATT (Chairman of the Kelty Gas Company), replying on behalf of the Directors, said they were very pleased to welcome the Juniors to their works. They were proud of their works and their Management.

Provost GORRIE (Dunfermline), Secretary to the Company, also spoke, tracing the history of the Company.

HOW WE DESIGNED A PRIZE-WINNING GAS-WORKS.

By JAMES STORRIER, Corporation Gas Department, Dundee.

The conditions of the Competition organized by Messrs. Newton, Chambers, & Co., Ltd., as most of you will remember, were to construct a model of a gas-works lay-out and provide an accompanying description of the lay-out. For purposes of adjudication marks were to be awarded as follows: 30% for the general construction of the model, 30% for the lay-out of the works in order to achieve the most convenient and economical working, and 40% for the description of the works and the reason for the particular apparatus and lay-out being chosen, having regard to efficient production costs.

The works designed and described had necessarily to be rather large to allow of the economical use of mechanical appliances, and for this reason competitors had to design their models round the following capacity: 4-5 million c.ft. of coal gas, and 2-3 million c.ft. of water gas per day. These outputs for both coal gas and water gas are identical with our own at Dundee, and this coincidence possibly had something to do with our success in the Competition.

Competitors were supplied with a certain amount of material with which to construct their models. This consisted of one sheet representing the site available for the lay-out of the buildings, plant and roads, and also several sheets on which portions of the buildings and plant were available for cutting out and fixing together to represent well-known portions of plant of the average gas-works type. A quantity of black and grey crinkled paper representing coal and coke heaps, and some green cotton wool for mounting on match sticks representing trees, were also supplied. Competitors could, however, if they thought fit, deal with other forms of plant in their lay-out and description, and make up the materials required for the additions.

I might say that when Mr. Wilson handed over this material and we had given it a look over, we had no serious intentions of participating in the contest, as most of us at that particular period were more seriously engaged in the evenings in studying for examinations at the local Technical College. It was, therefore, merely from amusement that we commenced to cut out and endeavour to piece and fix together some of the outfit supplied. I think the use of the word "endeavour" is strictly correct in that we discovered that the fixing together of some of the portions of plant, and particularly the smaller portions, required a tremendous amount of patience if a homogeneous looking object was to be created. Many and varied were the sticky solutions we experimented with in order to obtain a quick setting and permanent fixture. Some of us swore by one kind, others swore by another, and, I regret to say, that in the sticking business most of us swore all the time.

Our temporary drawing office, in which we prepared the model, is during the winter months subject to extremes of temperature, and these conditions tended to distort the finished shell-like paper objects into shapes totally unlike what they were supposed to represent. Our interest had been aroused in the competition by this time, principally, I think, through our many failures to construct a really realistic piece of plant, and we began to realize that if this object was to be attained it would be necessary to stiffen each item constructed. This, of course, incurred a great deal of extra work, but the results were worth the trouble, and the fact that 30% of the marks was to be awarded for general construction more than justified our decision. Most of the objects were stiffened up with wooden blocks hollowed out in the centre to reduce the weight, and brass or copper tubing was used in some of the small circular objects. The most difficult thing we had to construct was the purifying shed, and this was due to the fact that the building was a steel structure with, as is usual, no outer brick wall. The steel columns and cross girders, carrying the oxide boxes, revivifying floor, and roof, were approximately ⅛ in. wide on paper, and without stiffening formed a flimsy looking structure. We decided, therefore, after many ideas had been rejected, to construct an outer wall and roof of practically colourless celluloid, on the outside of which we pasted the coloured paper representing the columns and cross girders. This was a complete success and allowed one to view the boxes, &c., inside the building. As a matter of fact, if not viewed from a close-up position, it was difficult to see that celluloid had been used in the construction.

The parts to represent the coal and coke heaps were then prepared by cutting wooden blocks to the necessary shape, and covering these with the black and grey crinkled paper. The paper was then given a thin coating of glue, and, when still wet, finely powdered coal and coke were dusted on to the surface.

Having constructed most of the plant available from the material supplied, we commenced to reason out what additional plant we ought to incorporate in the finished model. Only one main storage holder and the water gas plant relief holder had been included in the material supplied, and we were all agreed that an additional holder should be incorporated in our scheme. The capacity of the spiral-guided holder supplied was assumed to be 5 million c.ft. and the carburetted water gas relief holder 750,000 c.ft. The maximum day's output from the works had been assumed at 8 million c.ft., and we agreed that, allowing for the large carburetted water gas plant, additional storage of 2 million c.ft. would be adequate. In view of the fact that we had also considered including a "Dri-gas" plant in our scheme, and in order to obtain practically constant pressure on the inlet side of the station governors, our choice was a waterless type of holder. You will note that the type we adopted was a Klönne, and I assume you are curious to know why we selected this type in preference to the M.A.N. when so very few of the former had been erected in this country. We had two principal reasons for our selection. First, we considered, after a little discus-

sion, and we may be wrong, that the designers of the Klönne had overcome some of the disadvantages of the M.A.N. Secondly, it was going to be much easier to construct a model of the circular shape Klönne than the polygonal sided M.A.N.

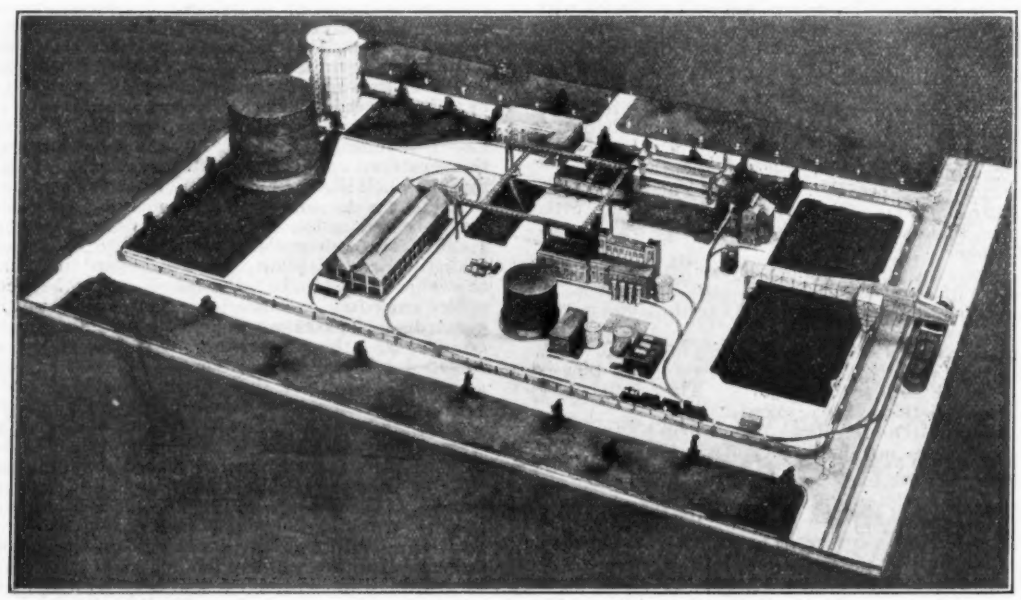
You will note from the essay that a booster, in conjunction with the "Dri-gas" plant, has been interposed between the main storage holder and the waterless holder, the purpose of the booster being to overcome the difference in pressure between the former and the latter when the waterless is being filled up from the main holder. The outlet of the waterless is coupled up to the station governors, but as the booster is on the outlet side of the "Dri-gas" plant it can be brought into action in the event of failure of the waterless holder. The booster has also been arranged in this position to ease the pressure in the "Dri-gas" plant. You will note that several advantages accrue from this arrangement of holders, and the fact that the whole of the storage is "effective storage" from the pressure aspect is an important one. I mention this arrangement because, during the exhibition of some of the models in London during the meeting of the Institution of Gas Engineers in June last year, this arrangement created more discussion and comment than any other item on the model. As a matter of fact, I think, several engineers who were considering the installation of waterless holders had their ideas refreshed from this arrangement.

selection, but does not this merely illustrate the educational benefits we derived from the construction of the model? It would appear that the Lessing plant, although a first-rate proposition as a laboratory model, is not free from problems requiring solution, when worked on a large scale. However, I have no doubt that science combined with "elbow grease" will eradicate these difficulties and in time it will evolve as the ideal coal cleaning plant.

You will note from the essay that, with the betterment of quality of coke still under consideration, we have included a Sulzer dry-coke cooling plant in our scheme, but as we had arranged to confine this in the retort house buildings we were saved the trouble of constructing plant to represent this item.

Other additional buildings included one for housing the station meters, and the upper floor of this building was to be used as a works laboratory. Several smaller buildings were also constructed to represent additional necessary plant throughout the works, which were not included in the original material supplied.

Our next task was to arrange the various portions of plant on the site plan, and this was undoubtedly the most interesting part of the competition. With the knowledge that 30% of the total marks was to be awarded for a lay-out for convenient and economical working, we shuffled those parts about like the pieces in a game of chess, in our endeavour to attain our end. Points we had to bear in



THE PRIZE-WINNING MODEL.

The next addition to the plant we had under discussion was a coal cleaning plant. We considered this necessary because we had decided to carbonize in our intermittent verticals a mixture of cheap coking slacks, size 1 in. to 0 in. The inclusion of a coal cleaning plant in a gas-works lay-out may seem unusual, and one might say with some justification redundant. It might be argued that this is a job for the colliery owner, and why therefore pay carriage on stones and dust unnecessarily. Our view was this. We are transporting coal in our own barges, by river and canal, at a very low rate, and a 10% increase in tonnage carried is a small consideration under these conditions. Then, how often do we, in a large works, receive a consignment which the colliery has either omitted to wash and screen, or has washed so well that the gain through reduction in ash has been paid for twice over by the increase in moisture? You may ask what effect can one consignment with a high ash content have among so many. Our answer would be that this might be the portion you would sell as coke to your best local customer; and you know what that would mean. It was with these points in view, and in our endeavour to produce a high grade coke from our lay-out, that we decided to include this coal cleaning plant. We considered several methods of cleaning from the theoretical aspect, as none of us had any practical experience of this problem. We decided that the Lessing plant was the most advantageous for our requirements, and certainly on paper seemed to be a better proposition than many of the older and well-tried washer systems. I have since heard that in this case we may have been somewhat premature in our

mind in connection with this were, first, the coal and coke handling circuit had to be as short as possible but with ample allowance for storage; secondly, the lay-out of the purification plant in such a way that the travel of the gas from the benches and carburetted water gas plant to the storage holders should be as direct as other conditions would allow; thirdly, the allowance of ample space at all stages in order to allow for future extensions; fourthly, the lay-out of the carbonizing, purification and bye-product plant relative to the works railway lines, so that traffic could be handled expeditiously with a minimum of shunting operations; fifthly, a point too seldom studied in gas-works design—viz., the æsthetic. You will realize then that we spent a great deal of time and thought on this part of the work, and you will appreciate our efforts in this direction, the more carefully you study the lay-out of this model. After many likely lay-outs had been rejected we developed one, which, in our opinion, satisfied all these conditions, and the next part of the work was proceeded with.

This consisted of marking off the position of the plant on a prepared plan similar to the site plan supplied, before removing the plant from the latter. The site plan was now prepared by drawing in roads, paths, rail tracks, &c., and then coloured to harmonize, as far as possible, with the rest of the lay-out. A piece of three-ply wood had then to be cut to act as a base-board for the site plan, and cross-pieces screwed on the underside to prevent buckling. I noticed, during the exhibition of the models in London, that several of these had suffered severely through lack of

this precaution. The fixing down of the site plan on to the base-board was an exceptionally ticklish job, but fortunately it was carried out successfully.

We then commenced finally to assemble the parts with, in the process, the liberal use of more sticky substances. The fact that most of the larger units had been stiffened with wood assisted us greatly during this operation, as we were thus able to screw these down from the underside of the base-board. The most difficult object to erect was undoubtedly the telpher stanchions and rail track, as the latter would persist in buckling before the fixing solution had properly set, and in order to prevent this the whole of the track had to be eventually lashed together with a Spanish windlass arrangement.

With the plant all properly fixed in position, the final job of "brightening up the landscape" and erecting the fence around the works commenced. This was the most entertaining part of the work, and many humorous suggestions were put forward to achieve the result. The very fine lawns which you see inside and outside the works were produced from a damaged piece of billiard table baize gifted by a local proprietor. The realistic looking foliage you see on the trees even has a history. This was once part of a very large tree in the front garden of one of those old fashioned barometers in which the lady goes to market when it is fine and the gentleman when it is wet. This apparatus was the proud possession of our weigh-houseman, but one fine day he missed his tree. The street lamps were the result of an economic brainwave. They are made from pins and pearls, the expensive kind that can only be purchased in that exclusive quarter known locally as "Woolies." The engine with wagons and the coke lorry were made from brass and sheet metal soldered together. This tricky little job and the painting of them was carried out by one man. The fence surrounding the works is also of sheet metal, and tags were left on this when cutting, so that the fence could be pegged on to the baseboard. I might mention here that the stanchions of the coke hoppers were cut from square section tinned copper wire once used by radio fans.

With the model completed the writing of the essay was proceeded with. This was quite a straightforward business, as the general lines had been pieced together in our minds during the construction of the model. Minor calculations required to be made here and there for plant capacity in order that each stage of the process might reasonably agree with the stated output, but as our plant at Dundee has practically a similar output we had excellent grounds upon which to base our figures.

Discussion.

Mr. WM. SCOTT (Tillicoultry), thanking Mr. Storrier for his paper, congratulated the Dundee Staff on their achievement and the distinction they had brought to the Association in winning the Model Gas-Works Competition.

Mr. SYDNEY SMITH (Dunfermline) also added his appreciation.

Mr. A. C. REA (Edinburgh) remarked that as one of the consolation prize winners in the Competition he fully realized the amount of time and thought the Dundee men must have given to their model. Referring to the electrical generating set, he preferred to see a 200 and 100 KW. plant instead of twin 150-KW. generators, as power could be saved by running the smaller plant during periods of minimum demand, and it was still possible to obtain the same maximum output from the station. He preferred to see all plant, mains, &c., above ground; in this position faults could be more easily traced and rectified. The workshops should be as central as possible to avoid loss of time in getting to a job. Workmen's houses should be erected as far away from the works as possible to avoid the nuisance of coke dust and to eliminate as far as possible the gas-works atmosphere.

Mr. JAMES CAMPBELL (Dunfermline) said that such a competition showed the many points which had to be taken into consideration in gas-works design. It was an education well worth the time and thought spent on it.

Dr. PARKER (Cowdenbeath) said that while not vocationally associated with the Gas Industry he had taught for many years allied subjects. Mr. Storrier had stated that he had found some difficulty in handling Canadian balsam. Had he dissolved the latter in xylol and applied the solution hot he might have reduced those difficulties.

Mr. STORRIER thanked the speakers for their remarks. In deciding to install the twin 150-KW. electrical generating plant they had considered the matter from an economical viewpoint in that spare armatures would require to be kept for each plant. This was rather a costly business for plant of this size, and as power on a gas-works was usually very cheaply available they had decided on the twin installation. He agreed with Mr. Rea's further remarks.

The Hong Kong and China Gas Company, Limited

The Annual General Meeting of the Shareholders was held at the Company's Offices, 148, Gresham House, Old Broad Street, E.C., on Thursday, April 13, 1933—Mr. ROBERT H. GLEN, F.C.A., Chairman, presiding.

The ASSISTANT-SECRETARY (Mr. S. F. Field) read the notice convening the Meeting and the Auditors' Report.

The CHAIRMAN: Gentlemen, a copy of the Report and Statement of Accounts having been sent to each Shareholder, I will ask you to take the same as read.

Before I deal with the Accounts under review, I should like to first refer to the absence of one of our Directors, Major Heriot R. Glen.

Major Glen had arranged, earlier in the year, to take a sea cruise to the West Indies, and, just prior to embarking, had the misfortune to meet with an accident, which necessitated his keeping to his bed for some time. I am pleased to say Major Glen is now about and the doctors considered it advisable for him to take a short holiday, which he is now enjoying.

This is the first occasion, since Major Glen's election to the Board in 1924, that we have not had the pleasure of his presence.

Hong Kong, like most other Colonies, has felt the severe trade depression and, speaking generally, adverse conditions prevailed throughout the Island during the year under review.

Now I will turn to the Accounts. When I had the pleasure of addressing you in May last year I mentioned that the dollar Exchange had somewhat improved during the last three months of 1931—this improvement was maintained for the year under review, with the result that the average dollar rate for 1932 was 1s. 3$\frac{3}{4}$d. as compared with 1s. 0$\frac{3}{4}$d. for the previous year. So far this year, the Exchange has not varied to any appreciable extent and is, at present, quoted at 1s. 3$\frac{1}{2}$d. per $.

The price of Gas remains unaltered. You may remember it was raised on 1st May, 1931. To induce present and prospective consumers to use more Gas, it was considered advisable for the Company to adopt a scale of discounts whereby the rate of discount increased in ratio to the larger quantity of Gas consumed. This Scheme came into force on 1st January this year, the rates varying from 2$\frac{1}{2}$ per cent. for consumptions of Gas up to 5,000 cubic feet per month to 33 per cent. for 100,000 cubic feet per month and upwards.

The sale of Gas at Hong Kong diminished by 5 million and increased by 1 million at Kowloon. The decrease at Hong Kong is partly accounted for by the curtailment of Gas for Public Lighting. The Government, as a measure for economy, decided to extinguish certain lamps at 12 midnight at Hong Kong and this alone has affected our sales to the extent of over a million cubic feet. During the year a water shortage was experienced at Hong Kong; this, however, is not unusual in the Colony, and it is somewhat difficult to give an estimate of the actual effect on the Company's business. For instance, during May and June in particular, the use of Geysers was considerably curtailed through the water shortage. Only three hours' supply daily was available to European residences and although considerable rain had fallen in the early part of June, the Authorities intimated that they were unable to then improve the supply. Consumers therefore were unable to use Geysers to the same extent as when a normal supply of water was available and the Company lost a certain amount of business as a result. The restrictions were not withdrawn until the end of June.

At our last Meeting, I referred to the capacity of our Kowloon Works, which has been constantly under consideration. You will remember one of your Directors, Mr. Alex. A. Johnston, visited the Colony and he made investigations on the spot as to whether a scheme of reconstruction at the present site should be undertaken, or whether a transfer to new Works would be the more suitable. Much consideration has been given to this and your Board has decided to adopt the latter proposition. A well situated piece of land with an area of about three acres has recently been purchased from the Government at a cost of about £4,000, and we hope to be in possession of this land in June or July. Our intention is to erect a Gas Holder on the new site during 1934 and over a period of, say, four years to gradually transfer the Kowloon Works to the new site.

There was a small increase during the year of the number of Street Lamps lighted by Gas—the total number at 31st December being 2,500. I am, however, pleased to report that the Company received an order from the Government during March this year for a further 52 Public Lamps, all of which will be fixed in Hong Kong.

Turning now to the Revenue Account—Coal Carbonized is reduced from 336,346 in 1931 to 281,508 for 1932, the average price of Coal being about 3 dollars less per ton than for last year, the quantity of Coal used being also slightly less.

Much less C.W. Gas was manufactured—thus the item shown, $12,227, is much lower than previously.

The higher Exchange Rate ruling throughout the year is mostly the cause for working Expenses being lower this year, the figure being $167,950, as compared with $197,376 for 1931.

The cost of Maintenance of Retorts and Mains is about the same as last year. Maintenance of Works is higher by $10,000, it being necessary to undertake more renovations.

Bad Debts A/c. is considerably higher than before, the figure of $2,909 being mostly due to bad trading conditions during the year.

Our cost for Publicity was slightly less by $300.

Passages Account is reduced from $11,819 to $2,284, the reason for this being that only two European Members of the Staff proceeded home during the year.

The item for Bonus to Staff, etc., is much higher at $35,459 as compared with $21,555—this is, of course, accounted for by the increased dollar profit shown for the year.

The Depreciation of Meters, Stoves, etc., went down from $49,040 to $40,774, the difference in Exchange being mostly responsible for this reduction.

The charge of $12,435 for alterations to Stores, Quarters, Offices, etc., represents the cost of completing the work to which I referred last year and for which 1931 Accounts were charged with $39,187.

On the Credit side, an increase is shown in Gas Rentals of $10,710, due principally to the higher rate for gas which prevailed for the whole of 1932.

There is a slight increase in Meters and Fittings Rentals, the figure being $80,640 as compared with $79,672.

The quantities of Coke and Tar sold were larger than previously and better prices were obtained, thus enabling us to show an increase of $19,000 in the Residual Products A/c. I am pleased to say a profit on Gas Fittings Work for the year is shown amounting to $8,174.

Our Manager at Hong Kong, Mr. H. E. Stone, has, during the latter part of the year, made keen efforts to increase the use of Gas amongst the Chinese population. He designed simple cooking apparatus consisting of single and double Cast Iron Cookers, which are produced by us at $3.50 and $15 each respectively. They are of robust construction and will stand up well to Chinese use.

I am pleased to say the profit shown in the London Revenue Account, viz., £20,951 is £12,834 more than for 1931, due to the higher dollar profit and the higher average rate of Exchange.

Further comments on the Accounts, I think, are not necessary, but I shall be pleased to answer any questions you may desire to put to me thereon.

The balance of Net Revenue is £50,520 18s. 2d. and we recommend a Dividend for you this year at the rate of 10 per cent. per annum, free of Income Tax, less the Interim Dividend paid 15th October last.

I feel convinced that after reviewing the Company's workings for year 1932, you will agree that, in spite of severe trade depression and competition from both Electricity and Oil, our position, as now put before you, is very satisfactory.

I now have pleasure in moving that the Report and Accounts be received and adopted; before, however, I sit down, I should like to say how much we regret not having with us to-day our Secretary, Mr. A. C. Pullen, who is, unfortunately, away owing to illness.

Mr. ALEX. A. JOHNSTON seconded the Resolution, which was carried unanimously.

The CHAIRMAN then moved the following Resolution:

> "That a Dividend at the rate of Ten per cent. per annum free of Income Tax be declared for the year ended 31st December, 1932, less 5 per cent. Interim Dividend paid 15th October, 1932, the Warrants to be made payable on the 19th April, 1933."

which was seconded by Mr. H. ROYSTON ASKEW, and carried unanimously.

The re-election of Mr. H. Royston Askew, as a Director, was proposed by the CHAIRMAN, who emphasized how qualified for the position Mr. Askew is. Mr. ALEX. A. JOHNSTON seconded the Resolution, which was unanimously carried.

Mr. H. ROYSTON ASKEW proposed the re-election of Messrs. Cash, Stone, & Co., as Auditors for the ensuing year at the usual fee, which was seconded by Mr. ALEX. A. JOHNSTON and carried unanimously.

The CHAIRMAN then proposed a vote of thanks to the staff in Hong Kong and London, and expressed his appreciation of the hard work which had been done in Hong Kong by all, from the Manager downwards.

The CHAIRMAN then referred to the many faithful years' work of the Secretary and expressed his good wishes for a speedy recovery in health.

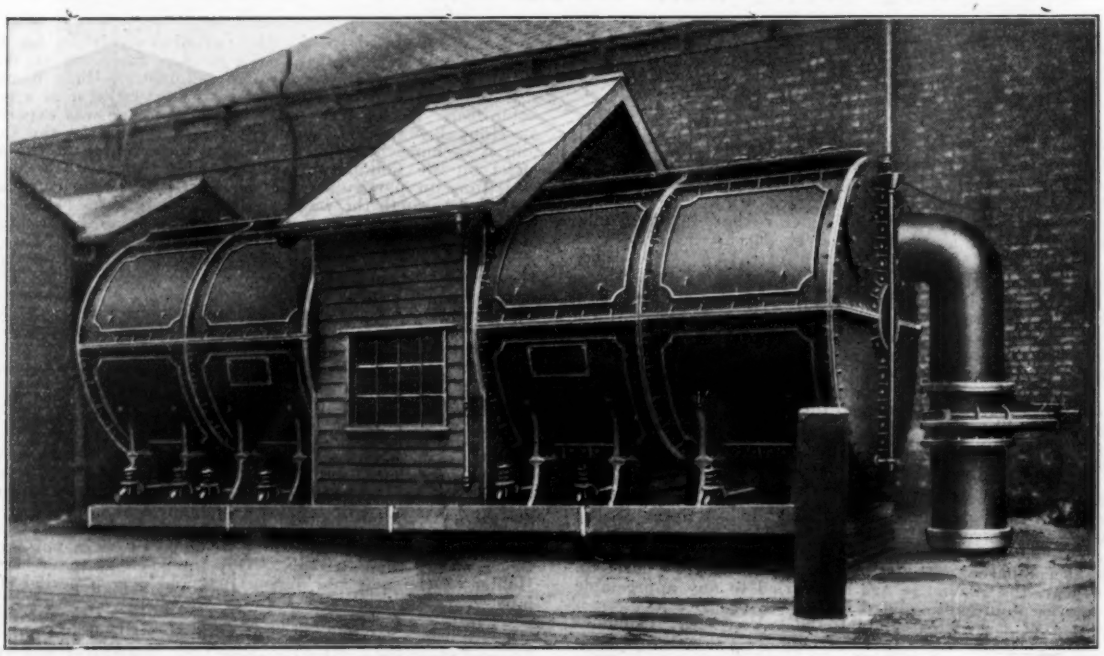
The CHAIRMAN also referred to the satisfactory work which had been performed by Mr. S. F. Field, the Assistant Secretary, during Mr. Pullen's absence. Our Hong Kong Manager had the local Accounts sent home by Air Mail. This, together with hard work in the London Office, has resulted in the Accounts being presented to Shareholders about six weeks earlier than last year.

Mr. ALEX. A. JOHNSTON seconded the motion, which was unanimously carried.

A vote of thanks to the Chairman was proposed by Mr. ALEX. A. JOHNSTON, seconded by Mr. H. ROYSTON ASKEW, and carried unanimously.

The proceedings then terminated.

ROTARY - WASHER - SCRUBBERS



R & J. D.'S WASHER SCRUBBER FOR THE RECOVERY OF BENZOLE & AMMONIA OR THE EXTRACTION OF NAPHTHALENE.

R. & J. DEMPSTER, LTD., MANCHESTER.

LONDON OFFICE: 34, VICTORIA STREET, WESTMINSTER, S.W.1.

Register of Patents

Disc Gasholders.—No. 385,893.

BAMAG-MEGUIN AKTIENGESELLSCHAFT, of Berlin.

No. 20,951; July 25, 1932. Convention date, May 13, 1932.

This invention relates to a disc gasholder so constructed that the packings and their components located at the edge of the disc can be repaired or replaced without having to move the disc out of the holder.

This result is achieved by providing the lower part of the shell of the gasholder, in the vicinity of the foundation, with an opening which extends round a portion of the perimeter of the gasholder and is adapted to be tightly closed by means of plates. Alternatively, there may be provided a covered-in passage way of suitable dimensions, which is located outside the actual gasholder and accessible through one or more apertures (doors or manholes) adapted to be tightly closed, the opening or passage way being fitted internally with devices on which the lowered disc can be supported to enable it to be rotated on the axis of the gasholder so as to bring the packing into position before the opening or passage way. Suitable devices for that purpose may consist of rollers, on which the disc is mounted, or of a tank, containing liquid, in which the disc floats, even without gas (which can be blown out and replaced by air) being present under the disc. The liquid is preferably admitted into the tank only just previous to the device being made use of.

Gas Heaters.—No. 386,804.

RADIATION LTD., of Birmingham, and YATES, H. J., of Grosvenor Place, S.W. 1.

No. 3952; Feb. 10, 1932.

This invention has for its object to provide an improved gas heating apparatus of the radiator type in which luminous flames are employed.

The invention comprises the combination of a reflector situated in the lower part of the apparatus behind a front aperture, a gas burner arranged (preferably out of the line of normal vision) above the reflector, a refractory perforated partition situated above the burner, and a hot gas chamber disposed above the partition, the chamber consisting of a pair of superimposed hollow parts having either a free outlet situated between their adjacent ends, or a flue outlet on the upper part, with a restricted communication passage between the parts.

Further, the invention comprises the combination with the reflector and hot gas chamber, of an enclosing case having perforations in one or more of the walls adjacent to the hot gas chamber to allow air to flow towards and away from the exterior surfaces of the chamber.

Parliamentary Intelligence.

[From Our Special Correspondents.]

House of Lords.

Special Orders.

A Special Order made on the application of the Ilfracombe Gas Company has been laid before the House and referred to the Special Orders Committee.

The Sunderland Gas Order has been examined by the Special Orders Committee, who have reported that in view of the petition presented by the Sunderland Corporation against the Order and having regard to sub-section (6) of Standing Order 212, they are of opinion that there should be a further inquiry by a Select Committee; that they have received a report from the Board of Trade on the Order, that in connection with such report they have considered the question of *vires;* while some doubt has been entertained as to the power of the Board of Trade by Special Order under the Gas Undertakings Acts, 1920 and 1929, to alter the existing maximum price of gas supplied by the Company, the Committee saw no objection upon that ground to the Order being approved by resolution of the House. Read and agreed to—the Select Committee to be proposed by the Committee of Selection.

Private Bills.

The South Suburban Gas Bill has been read a third time, passed, and sent to the Commons.

House of Commons.

The South Suburban Gas Bill has been read a first time.

The Gas Light and Coke Company Bill has been reported with amendments; the report to lie upon the Table.

The following petitions have been withdrawn in connection with the Commercial Gas Bill: West Ham Corporation; London County Council; Bethnal Green and Poplar Borough Councils; London and Home Counties Joint Electricity Authority. The Bill, being now unopposed, has been referred to the Committee on Unopposed Bills.

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TELEPHONE: BALHAM 1244-5-6 TELEGRAMS: "POTTERTON, BAL. LONDON."

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The chief event last week was America's abandonment of the gold standard. The decision brought with it a rise in commodity prices in that country, furious activity on Wall Street, and turned the world's currencies into chaos. These disturbing influences naturally affected business on the Stock Exchange, and at one time gilt-edged securities were substantially marked down, though towards the close on Saturday a more optimistic tone was in evidence and prices improved in most sections, while dealers reported increased support for the new account.

The general situation was to some extent reflected in the Gas Market, for instead of the gradual upward movement of prices, which has been a feature for some time past, values remained stationary with the exception of two stocks—Bristol and Derby—which were marked up on the local Exchanges. There were no decreases, however, neither was the volume of business in any way affected; and although many transactions were recorded at prices above those of the previous week, these were not sufficiently higher to justify any increase in the quotations.

The Directors of the Imperial Continental Gas Association have recommended a final dividend of 7% on the increased capital, payable on May 19, making 12%, less tax, for the year to March 31. For 1931-32 an interim dividend of 7½% was paid on a capital of £2,800,000. This amount of capital was subsequently doubled by the distribution of a capital bonus of 100%, and a final dividend of 7% was paid for that year on the increased amount, the total distribution being equivalent to 10¾%. A large volume of business was done in this stock last week at prices varying from 200 to 215, and at the present middle market price of 207 the yield on a 12% basis works out at £5 16s. %.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *April* 24.

The position in the tar products market is as follows:

Pitch remains quiet, and the price is called about 90s. per ton f.o.b., according to period of shipment.

Creosote is about 2¾d. per gallon f.o.b.

Refined tar is about 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 4d.; pure benzole, about 1s. 11d.; solvent naphtha, 95/160, about 1s. 7d. to 1s. 8d.; and 90/140 pyridine bases, 3s. 6d. to 3s. 9d. per gallon naked at makers' works.

Tar Products in the Provinces.

April 24.

The average prices of gas-works products during the week were: Gas-works tar, 34s. to 39s. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked, North, 1s. 9d. to 1s. 10d. Coal-tar crude naphtha, in bulk, North, 6d. to 6½d. Solvent naphtha, naked, North, 1s. 5½d. to 1s. 6d. Heavy naphtha, North, 10d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 2¼d. to 2¾d.; low gravity, 1¾d.; Scotland, 2¼d. to 2¾d. Heavy oils, in bulk, North, 4½d. to 5d. Carbolic acid, 60's, 2s. 9d. to 2s. 10d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *April* 22.

The volume of business is gradually increasing, but prices continue rather low, although in some cases it is considered that bottom has been reached.

Crude gas-works tar.—The actual value is 42s. 6d. to 47s. 6d. per ton *ex* works.

Pitch.—Few orders are on hand and values are round 77s. 6d. to 80s. per ton f.o.b. Glasgow for export and 80s. to 82s. 6d. per ton *ex* works in bulk for home trade.

Refined tar to Ministry of Transport Specification is quoted at from 3¼d. to 3¾d. per gallon *ex* works naked, according to quantity.

Creosote oil.—A fair volume of business is taking place in the home market. B.E.S.A. Specification is 2¼d. to 2¾d. per gallon; low gravity, 2d. to 2½d. per gallon; and neutral oil, 2½d. to 2¾d. per gallon—all in buyers' rail tanks *ex* works.

Cresylic acid.—More interest is being taken in all grades, but values remain easy. Pale, 97/99%, is 10d. to 11d. per gallon; dark, 97/99%, 9d. to 10d. per gallon; and pale, 99/100%, 1s. 1d. to 1s. 2d. per gallon—all f.o.r. in buyers' packages.

Crude naphtha.—Supplies are increasing, although value is unchanged at 4½d. to 5d. per gallon, according to quantity and quality.

Solvent naphtha.—90/160 grade is 1s. 3d. to 1s. 4d. per gallon, and 90/190 grade 11d. to 1s. per gallon *ex* works.

Motor benzole.—Quotations are unchanged at 1s. 4d. to 1s. 5d. per gallon in bulk *ex* works.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time.

	s. d.		s. d.	
Crude benzole	0 10½	to	0 11	per gallon at works
Motor ,, ...	1 6½	,,	1 7	,, ,, ,,
Pure ,, ...	1 10	,,	1 11	,, ,, ,,

Trade Notes.

British Aluminium Company, Ltd.

The telephone number of the London warehouse of the British Aluminium Company, Ltd., at 25-29, Pancras Road, N.W. 1, has been changed to Terminus 5301-2.

Crankless Compressors.

Messrs. George Waller & Son, Ltd., of Phœnix Ironworks, Stroud, have recently installed their Michell patent crankless compressors for the following gas undertakings: Gas Light and Coke Company, one gas engine driven unit. Vancouver, one gas engine driven unit. Primitiva Gas Company of Buenos Aires, one electrically driven unit. South Suburban Gas Company, two steam driven compressors. Coventry Corporation Gas-Works, two steam driven sets. They have on order at the present time two steam driven machines for the Cambridge Gas Company.

Contracts Advertised To-Day.

Coal.

Clitheroe Corporation Gas Committee. [p. 232.]

Dawlish Gas and Coke Company. [p. 232.]

Newport (Salop) Urban District Council Gas Department. [p. 232.]

Gasholder Additions.

Haverfordwest Corporation. [p. 232.]

Reinforced Concrete Hoppers.

Widnes Corporation. [p. 232.]

Retorts.

Birstall Urban District Council Gas Department. [p. 232.]

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see earlier page.]

Issue. £	Share.	When ex-Dividend.	Dividends. Prev. Hf.-Yr. % p.a.	Dividends. Last Hf.-Yr. % p.a.	NAME.	Quotations. April 22. (Provincial Exchanges April 21.)	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week
1,551,868	Stk.	Apl. 3	5⅞	7	Alliance & Dublin Ord. ...	120—130*	...	...
374,000	..	Jan. 9	4	4	Do. 4 p.c. Deb. ...	85—95	...	94½
557,655	..	Mar. 6	7	7	Barnet Ord. 7 p.c.	153—158	...	...
300,000	1	Oct. 17	1/9⅛	1/4⅛	Bombay, Ltd.	24/6—26/6	...	2f/3—25/6
178,280	Stk.	Feb. 20	9¼	9¼	Bournemouth sliding scale	195—205	...	...
550,050	..	..	7	7	Do. 7 p.c. max. ...	157—162	...	...
4.9,160	..	..	6	6	Do. 6 p.c. Pref. ...	137—142	...	...
50,000	..	Dec. 19	3	3	Do. 3 p.c. Deb. ...	75—80	...	...
162,025	..	..	4	4	Do. 4 p.c. Deb. ...	101—106	...	...
210,000	..	..	5	5	Do. 5 p.c. Deb. ...	122—127	...	...
367,900	..	Mar. 6	7½	7½	Brighton, &c. 6 p.c. Con. ...	152—157	...	...
540,000	..	..	6¾	6¾	Do. 5 p.c. Con. ...	141—146	...	143½—146½
195,500	..	..	6	6	Do. 6 p.c. B Pref.	133—143	...	...
1,487,500	..	Mar. 6	5	5	Bristol 5 p.c. max.	111—113a	+½	...
120,420	..	Dec. 19	4	4	Do. 1st 4 p.c. Deb. ...	100⅜—101¼a	...	...
217,870	..	..	4	4	Do. 2nd 4 p.c. Deb. ...	100⅜—101½a	...	...
328,790	..	..	5	5	Do. 5 p.c. Deb.	120—124a	...	...
855,000	..	Apl. 3	7	8	British Ord.	147—152*	...	148½—149
100,000	..	Dec. 19	7	7	Do. 7 p.c. Pref.	147—152	...	...
350,000	..	..	—	5½	Do. 5½ p.c. Pref. ...	105—110	...	...
120,000	..	..	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	98
450,000	..	..	5	5	Do. 5 p.c. Red. Deb. ...	105—115	...	...
160,000	..	Jan. 9	5	5	Cambridge 5 p.c. Deb. ...	117—122	...	...
100,000	10	Dec. 5	6	6	Cape Town, Ltd.	7⅞—8¼	...	8
100,000	10	Nov. 7	4½	4½	Do. 4½ p.c. Pref. ...	6—7	...	6¼
150,000	Stk.	Dec. 19	4½	4½	Do. 4½ p.c. Deb. ...	88—93	...	...
626,880	..	Feb. 20	6	6	Cardiff Con. Ord.	108—113	...	...
237,860	..	Jan. 9	2½	5	Do. 5 p.c. Red. Deb.	105—110	...	...
157,150	..	Feb. 20	5	6¼	Chester 5 p.c. Ord.	97—102½	...	...
98,936	1	Oct. 17	2/-	2/-	Colombo, Ltd. Ord.... ...	25/—30/-	...	...
24,500	1	Oct. 17	1/4⅛	1/4⅛	Do. 7 p.c. Pref. ..	19/—21/-	...	...
609,204	1	Mar. 20	/11 48	/11 48	Colonial Gas Assn. Ltd. Ord.	16/—18/-	...	...
296,053	1	..	1/3 30	1/3 30	Do. 8 p.c. Pref.	19/— 21/-	...	...
1,796,955	Stk.	Feb. 20	5	6¼	Commercial Ord.	112—117	...	...
475,000	..	Dec. 19	3	3	Do. 3 p.c. Deb. ...	75—80	...	...
265,272	..	Mar. 6	—	5	Do. 5 p.c. Deb. ...	120—125	...	...
807,560	..	Feb. 20	7	7	Croydon sliding scale ...	145—170	...	...
469,590	..	..	5	5	Do. max. div.	101—106	...	...
500,000	..	Jan. 9	5	5	Do. 5 p.c. Deb.	120—125	...	124
542,270	..	Mar. 6	7	10	Derby Con.	150—160c	...	...
55,000	..	Jan. 9	4	4	Do. 4 p.c. Deb.	80—85c	...	...
209,000	..	Mar. 6	5	5	East Hull Ord. 5 p.c. ...	100—105	...	...
179,500	..	Mar. 6	6	6	East Surrey Ord. 5 p.c. ...	120 125	...	...
155,019	..	Dec. 19	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
1,002,180	..	Apl. 3	15	17	European, Ltd.	133—138*	...	130—137
19,373,992	..	Feb. 20	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	25/— 26/-f	...	25/6—25/10½
2,600,000	..	..	3½	3½	Do. 3½ p.c. max.... ...	85—89	...	88—88½
4,477,106	..	..	4	4	Do. 4 p.c. Con. Pref. ...	102—105	...	102—104
6,102,497	..	Dec. 19	3	3	Do. 3 p.c. Con. Deb. ...	80—83	...	81—81½
3,642,770	..	..	5	5	Do. 5 p.c. Red. Deb. ...	115—118	...	116½—117½
3,500,000	..	..	4½	4½	Do. 4½ p.c. Red. Deb. ...	111—114	...	112—113¾
270,466	..	Mar. 6	6	6	Harrogate New Cons. ...	113—118	...	116½
82,500	..	Mar. 6	7	7	Hastings & St. L. 5 p.c. Conv.	138—143	...	...
258,740	..	..	5½	5½	Do. 3½ p.c. Conv.	110—115	...	112½
70,000	10	Oct. 17	†10	†10	Hongkong & China, Ltd. ...	12 13	...	...
218,200	Stk.	Mar. 6	6	6	Hornsey Con. 3½ p.c. ...	122—127	...	...
5,600,000	..	Nov. 21	14	10	Imperial Continental Cap.	202—212	...	210—215
223,130	..	Feb. 6	3½	3½	Do. 3½ p.c. Red. Deb.	89—94	...	...
235,242	..	Mar. 6	8½	8½	Lea Bridge 5 p.c. Ord. ...	170—175	...	...
2,145,907	..	Mar. 6	6	6	Liverpool 5 p.c. Ord. ...	125—126b	...	...
245,500	..	Dec. 19	5	5	Do. 5 p.c. Red. Pref. ...	105—115b	...	...
306,083	..	Jan. 19	4	4	Do. 4 p.c. Deb. ...	101—103b	...	...
165,786	..	Feb. 20	8	10	Maidstone 5 p.c. Cap. ...	180—200	...	...
56,176	..	Dec. 19	3	3	Do. 3 p.c. Deb. ...	70—75	...	...
75,000	5	Dec. 5	†10	†10	Malta & Mediterranean ...	8½—10½	...	...
392,000	—	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb. ...	98—103*	...	...
231,978	Stk.	Mar. 6	5	5	M. S. Utility "C." Cons. ...	103—108	...	107½—108
818,657	..	..	4	4	Do. 4 p.c. Cons. Pref.	92—97	...	...
112,126	..	Jan. 9	4	4	Do. 4 p.c. Deb. ...	102—104	...	...
148,955	..	..	5	5	Do. 5 p.c. Deb. ...	115—120	...	...
675,000	..	21 May '31	†6	†6	Montevideo, Ltd.	35—45	...	...
2,061,315	..	Mar. 6	5	5½	Newcastle & Gateshead Con.	24/8—25/3d	...	...
682,856	..	..	4	4	Do. 4 p.c. Pref. ...	100—102d	...	...
776,706	..	Jan. 9	3½	3½	Do. 3½ p.c. Deb. ...	90—92d	...	...
277,285	..	Nov. 7	5	5	Do. 5 p.c. Deb. '48 ...	107—109d	...	...
274,000	..	Feb. 20	5	5	Newport (Mon.) 5 p.c. max.	99—101a	...	...
204,940	..	Mar. 20	7½	7½	North Middlesex 6 p.c. Con.	132—142	...	...
396,160	..	Feb. 6	5	5	Northampton 5 p.c. max. ...	98—103	...	...
300,000	..	Dec. 5	7	9	Oriental, Ltd.	116—121	...	...
205,162	..	Dec. 19	8	8	Plym'th & Stonehouse 5 p.c.	155—165	...	160½—161½
504,416	..	Feb. 20	8	8	Portsm'th Con. Stk. 4 p.c. Std.	160—165	...	165
241,446	..	..	5	5	Do. 5 p.c. max. ...	102—107	...	...
114,000	..	Feb. 20	5	5	Preston 5 p.c. Pref.	103—108	...	...
686,312	..	Jan. 23	4	4	Primitiva 4 p.c. Rd. Db. 1911	82—87	...	...
389,813	..	Dec. 19	4	4	Do. 4 p.c. Cons. Deb.	82—87	...	...
150,000	10	Mar. 20	6	6	San Paulo 6 p.c. Pref. ...	6⅞—7⅛	...	...
1,736,968	Stk.	Sept. 5	6	6	Sheffield Cons.	121—123e	+2	...
95,000	..	Jan. 9	4	4	Do. 4 p.c. Deb.	91—95e	...	...
133,201	..	Feb. 20	8½	5	Shrewsbury 5 p.c. Ord. ...	125—130	...	...
90,000	10	June 6	15	15	South African	3—5	...	...
6,709,895	Stk.	Feb. 20	5	7	South Met. Ord.	127—130	...	128½—129½
1,135,812	..	..	6	6	Do. 6 p.c. Irred. Pf.	138—143	...	141
850,000	..	..	—	20/-g	Do. 4 p.c. Irred. Pf.	100—104	...	100½—101
1,895,445	..	Jan. 9	3	3	Do. 3 p.c. Deb. ...	80—83	...	80—80½
1 000,000	..	Jan. 23	5	5	Do. 5 p.c. Red. Deb.	114—117	...	115½—116
209,820	..	Mar 6	8½	8½	South Shields Con.	47½—152½d	...	...
1,543,795	..	Feb 20	6	6	South Suburban Ord. 5 p.c.	124—129	...	127½—129
300,000	..	..	5	5	Do. 5 p.c. Pref.	113—118	...	116—117½
868,837	..	Dec 19	5	5	Do. 5 p.c. Deb.	120—125	...	125
647,740	..	Feb. 20	5	5	Southampt'n Ord. 5 p.c. max.	107—112	...	...
121,275	..	Dec. 19	4	4	Do. 4 p.c. Deb.	100—105	...	...
350,000	..	Mar. 6	9/-	5½	Swansea 5½ p.c. Red. Pref.	108—112	...	...
200,000	..	Dec. 19	6½	6½	Do. 6½ p.c. Red. Deb.	105—110	...	...
1,076,490	..	Mar. 6	6½	6½	Tottenham and District Ord.	142—147	...	145—146½
300,000	..	..	5½	5½	Do. 5½ p.c. Pref. ..	118—123	...	...
199,005	..	Dec. 19	4	4	Do. 4 p.c. Deb. ..	98—103	...	...
85,701	..	Apl. 3	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	80—85*	...	...
347,769	..	Mar. 6	7	7	Uxbridge, &c., 5 p.ct. ..	140—145	...	144½
88,330	..	..	5	5	Do. 5 p.c. Pref. ..	108—113	...	...
1,322,220	..	Mar. 6	7	7	Wandsworth Consolidated	145—150	...	...
1,096,373	..	..	5	5	Do. 5 p.c. Pref.	112—117	...	115—117
1,317,964	..	Dec. 19	5	5	Do. 5 p.c. Deb.	120—125	...	122½—124½
158,400	..	Mar 6	5	5A	Winchester W.&G. 5p.c. Cor.	105—110	...	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g.*—For quarter. *h.*—Paid £3. including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

STOCKS AND SHARES FOR SALE.

CHESHAM AND DISTRICT GAS COMPANY.

£5 PER CENT.

"B" PREFERENCE STOCK

of the above Company will be offered for SALE BY AUCTION by

Messrs. F. E. HOWARD, SON, & GOOCH

at the TOWN HALL, CHESHAM, BUCKS,

ON

Wednesday, the 3rd day of May, 1933,

at Three o'clock in the afternoon,

By instruction of the Directors of the Company.

Particulars and Conditions of Sale may be obtained at

The Offices of the Company, 79, High Street, Chesham, Bucks, of

Messrs. Francis & How, Solicitors at Chesham and Amersham, and of

The Auctioneers at Chesham and Amersham.

TROTTER, HAINES, & CORBETT LIMITED

BRETTEL'S ESTATE

FIRE-CLAY & BRICK WORKS

STOURBRIDGE

Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.

Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & Co., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

OVER

150

ENGINEERS

Purify

66,000,000,000

cub. ft. of coal gas

per annum

with

OUR OXIDE

MANCHESTER OXIDE CO. LTD.
MILES PLATTING, MANCHESTER

Telegrams: Oxide, Manchester

Telephone { 2283 } *Collyhurst*
{ 2284 } *Manchester*

AN APPEAL TO ALL THERMS

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SQUAD

Sergt. A. E. M. Meters has room for more Therms in his famous squad. Conditions of Service are severe. Therms are required to obey the Sergt. implicitly, and he is most critical. There is, however, compensation in the fact that every Therm is paid in full for every job he does.

Will you allow Sergt. A. E. M. Meters to control your Therms?

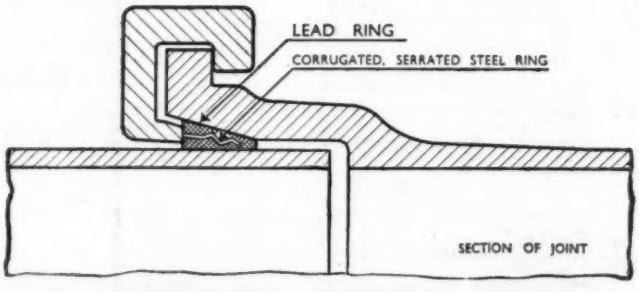
ALDER & MACKAY LIMITED

MAKE METERS OF METICULOUS MEASUREMENT

ALDER & MACKAY LTD., EDINBURGH, LONDON & BRANCHES.

The STANTON Mechanical Lead Joint

(Patent applied for)



NO INCREASED COST

This mechanically made joint works on a similar principle to the Stanton-Wilson Joint, but employs a lead ring in which is encased a thin corrugated, serrated steel ring. It is more flexible than a caulked joint and provides for expansion and contraction of mains—No skilled labour needed.

N.B.—Where a considerable degree of flexibility is required, use the Stanton-Wilson self-adjusting Joint, which has been adopted by over 200 Public Undertakings in this country.

The Stanton Ironworks Company Limited, Near Nottingham

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NOON ON TUESDAY is the latest hour for receipt of advertisement copy for the following day's issue.

FIRST POST ON MONDAY is the latest for receipt of alterations of standing advertisements.

RATES FOR UNDISPLAYED ADVERTS: Situations Wanted, Six Lines and under (about 36 words), 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum 4s. 6d. An additional charge of 6d. is made where replies are addressed c/o the "JOURNAL."

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A copy of the "G.J." Calendar and Directory is presented to Continuous Subscribers.

UNITED STATES.—Renewals after December, 1931, and all new subscriptions in the United States, to be made through ROBERT O. LUQUEER, Agent, WOOLWORTH BUILDING, NEW YORK, N.Y.

WALTER KING, LTD., 11, Bolt Court, Fleet Street, London, E.C. 4.
Telephone: Central 2236-7 (2 lines). Telegrams: "GASKING, FLEET LONDON."

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GEORGE WILSON GAS METERS, Ltd.
for
GAS-METERS, ORDINARIES, SLOTS, AND REPAIRS
Foleshill Road, COVENTRY.
'Phone: 8655 Coventry. Grams: "GASMETER."
Certus Works, Kingston Road, Raynes Park, LONDON, S.W. 20.
Radium Works, 11, Radium Street, Oldham Road, MANCHESTER.
(*See advertisement, March 29, p. 789, and next week.*)

HUTCHINSON BROTHERS, Ltd.,
FALCON WORKS, BARNSLEY.
MANUFACTURERS OF
GAS METERS (Ordinary and Slot).
"FALCON" INVERTED LAMPS,
SQUARE STREET LANTERNS
SUPERHEATER BURNERS, and
CONVERSION SETS for Street Lanterns.

PATENTS.

PATENTS for Inventions, Trade Marks "Advice Handbooks" and Consultations free. KING'S PATENT AGENCY LTD., Director B. T. KING, C.I.M.E., Regd. Patent Agent, G.B., U.S., and Can., 146A, QUEEN VICTORIA ST., E.C. 4, and 57, CHANCERY LANE (near Pat. Off.), LONDON, W.C. 2. 47 years' refs. 'Phone Cent. 0682.

MEWBURN, ELLIS, & CO.,
CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C. 2.
Telegrams: "Patent, London." 'Phone: 243 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

"METHOD of Purifying Gases from Sulphuretted Hydrogen by Decomposing the Latter into Hydrogen and Sulphur." The Proprietors of British Patent No. 289,885 desire to arrange for the commercial working of this patent by Sale outright or by Licences granted on participating and reasonable terms.
Particulars obtainable from TECHNICAL RECORDS, LIMITED, 59-60, LINCOLN'S INN FIELDS, LONDON, W.C. 2.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
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FOR Motor Lorries and Railway Traffic can be seen erected at our Works READY FOR DELIVERY. Inspection by your Engineer invited and a test by your Local Inspector of Weights and Measures before delivery. Every machine a High-Class Engineering Product and fully guaranteed.
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NATURAL BRITISH PURIFYING MATERIAL
AN ABSOLUTELY STANDARD PRODUCT.
MOISTURE GUARANTEED 28%
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"FIRST QUALITY" DUTCH BOG ORE
As supplied to most of the Principal Gas Works in Great Britain.

SPENT OXIDE PURCHASED.

OXIDE OF IRON.
SPENT OXIDE BOUGHT.
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Tins for Sale to Consumers.
In Bulk for Works Use.
(*See "Gas Salesman."*)
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Phone: Royal 1484.

APPOINTMENTS, &c., VACANT.

SALES MANAGER, No. 8301.

CANDIDATES are Thanked for their Applications, and informed that AN APPOINTMENT HAS BEEN MADE.

CANTERBURY GAS AND WATER COMPANY.

APPLICATIONS are invited by the Directors of the above Company for the Position of GAS ENGINEER, at present vacant owing to the sudden death of the late Engineer.

Age must not exceed 40 years. Salary, £600 per Annum inclusive—except Co-Partners' Bonus, in addition. Applicants must possess a thorough knowledge and experience of Modern Gas Manufacture and Supply, and capable, if required, of undertaking Constructional Work in connection with the Gas Undertaking.

The duties would also comprise Supervision of Mains and Services Laying, and Distribution of Water within the Company's area.

Applications, marked "Engineer," to be sent by 4th May, stating Age and Training Experience, also how soon Services could be available, accompanied by *copies* of not more than Three recent Testimonials, to be addressed to the SECRETARY OF THE COMPANY, CASTLE STREET, CANTERBURY.

MALVERN URBAN DISTRICT COUNCIL.

FOREMAN—GAS DISTRIBUTION DEPARTMENT.

THE Malvern Urban District Council invite Applications for the Position of FOREMAN, Gas Distribution Department. Commencing Salary £230, rising by annual increments of £10 to £250 maximum, subject to satisfactory service.

The Salary is subject to a temporary economy deduction, which amounts to £3 2s. 3d. for year ending March, 1934, also to contributions under the Superannuation Act, 1922.

Candidates must be not less than 25 and not more than 40 years of age, and should preferably have had experience of Mainlaying.

Applications, endorsed "Gas Foreman," stating Age, full particulars of Experience and Qualifications, with *copies* of Three recent Testimonials, to be received by the undersigned not later than Thursday, 11th May, 1933.

FREDERICK EDWARDS,
Clerk and Solicitor to the Council.
The Council House,
Malvern,
April 24, 1933.

SHOWROOM Salesman required for medium-sized Gas Undertaking in Home Counties. Previous experience essential.
Apply to No. 8312, "GAS JOURNAL," 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4, stating Age and giving details of previous Experience and Salary required.

TARPAULINS.

TARPAULINS.—Second-Hand Black Dressed, approx. 20 ft. by 14 ft., all thoroughly repaired, 25s. each. Redressed ditto, 30s. each. Carriage paid. Approval willingly. Thousands sold with full satisfaction. Cheapest makers new goods. Samples and lists on application.
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ROBERT DEMPSTER & SONS, Ltd., ELLAND, Builders of CARBONIZING PLANTS, both Horizontal and Vertical. Manufacturers of CONDENSERS, PURIFIERS, GASHOLDERS, &c., also every description of COAL and COKE HANDLING PLANT. Telegrams: "DEMPSTER, ELLAND." Telephone: ELLAND 261 (Private Branch Exchange).

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MANUFACTURERS of Gasholders, Tanks, Condensers, Purifiers, Scrubbers, Washers, and every description of Gas Plant.
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MANUFACTURERS **BRISTOL.**
and CONTRACTORS for
HANDLING PLANT,
SCREENS, TIPPLERS, ETC.

CONTRACTS OPEN.

WIDNES CORPORATION.

THE Widnes Corporation invite Tenders for the Supply, Delivery of all necessary Materials and Erection of REINFORCED CONCRETE COKE STORAGE HOPPERS. (The Hoppers are to be erected in conjunction with a new Mechanical Coke Handling Plant.)

General Specification of the Works and Form of Tender may be obtained from Mr. Chas. E. Dickinson, Gas and Water Engineer and Manager, Widnes.

The site may be inspected and any other information may be obtained upon application to the Engineer and Manager.

Sealed Tenders, endorsed "Reinforced Concrete Storage Hoppers," must be delivered to the undersigned not later than 9 a.m. on the 9th of May, 1933.

The Corporation do not bind themselves to accept the lowest or any Tender.

ERNEST W. MCNORTON,
Town Clerk.

Town Hall,
Widnes,
April 19, 1933.

BOROUGH OF CLITHEROE.

TENDERS FOR COAL.

THE Gas Committee of the Clitheroe Corporation invite TENDERS for the Supply of ROUGH DRY GAS SLACK and PEAS, to be delivered in such quantities as may be required during the Twelve Months ending 30th June, 1934.

The quantity to be supplied will be about 8000 Tons, and particulars and Forms of Tender may be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for Coal," to be sent to Wm. Self Weeks, Esq., Town Clerk, Duck Street, Clitheroe, on or before Saturday, the 6th May, 1933.

The Committee do not bind themselves to accept the lowest or any Tender.

R. BARRETT,
Engineer and Manager.

Gas-Works,
Clitheroe,
April 19, 1933.

BOROUGH OF MANSFIELD.

TENDERS FOR GAS COAL, LIME, SULPHURIC ACID, PURCHASE OF SURPLUS TAR, ALSO FOR SUPPLY OF NEW GAS METERS AND FOR REPAIRS TO GAS METERS.

THE Gas Committee of the Mansfield Corporation invite TENDERS for the following:

(*a*) Supply of SCREENED GAS COAL or COBBLES.
(*b*) Supply of LIME.
(*c*) Supply of SULPHURIC ACID.
(*d*) Purchase of SURPLUS TAR.
(*e*) Supply of NEW GAS METERS.
(*f*) Repair of GAS METERS.

as from 1st July next.

It will be a Condition of the Contract that the Standard Rate of Wages and Conditions of Labour prevailing in the district shall be observed.

Particulars may be obtained on application to Mr. James Gibson, Gas Engineer, Lime Tree Place, Mansfield, Notts.

Tenders, sealed and endorsed "Tender for 'Gas Coal,' 'Lime,' 'Sulphuric Acid,' 'Tar,' 'New Gas Meters and Repairs to Gas Meters'" (according to the commodity tendered for), to be delivered to the undersigned on or before Twelve noon on Monday, 8th May, 1933.

The Corporation do not bind themselves to accept the lowest or any Tender.

A. C. SHEPHERD,
Town Clerk.

Carr Bank,
Mansfield,
April 18, 1933.

HAVERFORDWEST CORPORATION.

TENDERS are invited for the Telescoping of an existing Gasholder in a Steel Tank by the provision of a NEW OUTER LIFT, also for the RE-SHEETING of the CROWN of the Existing Inner Lift.

Copies of the Specification and Plan may be obtained from the undersigned on payment of a deposit of One Guinea, which amount will be refunded on receipt of a *bona-fide* Tender.

Sealed Tenders, addressed to the undersigned, to be delivered by post not later than Friday, the 5th of May, 1933.

H. W. D. WILLIAMS,
Town Clerk.

Town Clerk's Office,
Haverfordwest.

THE DAWLISH GAS AND COKE COMPANY, LTD.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the Supply of about 2000 Tons of DRY CLEANED GAS NUTS, delivered at Dawlish Station in such quantities as may be required from the 1st of July, 1933, to the 30th of June, 1934.

Tenders, sealed and endorsed "Coal," to be sent to the undersigned not later than the 9th of May next.

H. VERSEY,
Manager and Secretary.

NEWPORT (SALOP) URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TENDERS FOR COAL.

TENDERS are invited for the Supply of 5,600 Tons of BEST SCREENED GAS COAL and 3,400 Tons of WASHED COBBLE NUTS. Analysis required.

No Form of Tender issued.

The above amounts to be spread evenly over a period of Twelve Months as from 1st July next, and delivered at the local L.M.S. Station.

Tenders, endorsed "Coal Tender," to be in my hands by Wednesday, the 3rd of May next.

E. G. JONES,
Secretary.

BIRSTALL URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE above Council invite Tenders for the SETTING of Two Beds of HORIZONTAL RETORTS (Six Retorts each Bed) at the Gas-Works.

Specifications may be had on application to Mr. Rufus Ellis, Manager, Gas-Works, Birstall, near Leeds.

Sealed Tenders, endorsed "Tender for Retorts," to be delivered not later than 10 a.m. on Saturday, May 6, 1933, to Mr. Horace Gray, Clerk to the Council, Council Offices, Birstall, near Leeds.

HORACE GRAY,
Clerk to the Council.

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CAST-IRON PIPES FOR SALE.
6 in. Socket and Spigot, 150 lengths, each 9 ft. As new.
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Immediate delivery.
Keen price to clear.
GEORGE COHEN, SONS, & CO., LTD., 600, Commercial Road, London, E. 14.

FOR SALE.—AVAILABLE IN JUNE.
ONE 10,000 c.ft. per hour Waller Combined Steam Driven EXHAUSTING SET complete with 7 in. Valves. In new condition.
One 9000 c.ft. per hour Bryan Donkin Belt-Driven EXHAUSTER, complete with 6 in. Valves. In new condition.
One Donkin COMPENSATOR, used with above, complete with 4 in. Butterfly Valve and all Connections.
The above plant, which may be seen working, is for Sale, due to larger plant being installed.
One 5-Ton per hour Waller COKE BREAKER. In good condition.
Apply for full information to
E. V. DUNN,
Manager and Secretary.
Gas-Works,
Minehead,
Somerset.

FOR SALE—Morris Manual Retort CHARGER, arranged for 22 in. by 16 in. by 10 ft. ⌂ Retorts, with 4 cwt. Charge. Comprising Charging Machine complete, spare Winch, 48 ft. Gantry Track and Runway. Can be seen at work at Dorking.
Apply to the CHIEF ENGINEER, THE EAST SURREY GAS COMPANY, REDHILL.

TANK WAGONS.

RAIL Tank Wagons — Several for Hire, Rectangular or Cylindrical, 12 and 14 Tons.
Apply GRINDLEY & CO., LTD., RAWCLIFFE, near GOOLE.

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ENSURE FULLEST SAFETY AND WORK.
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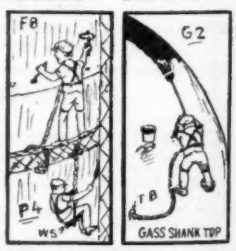

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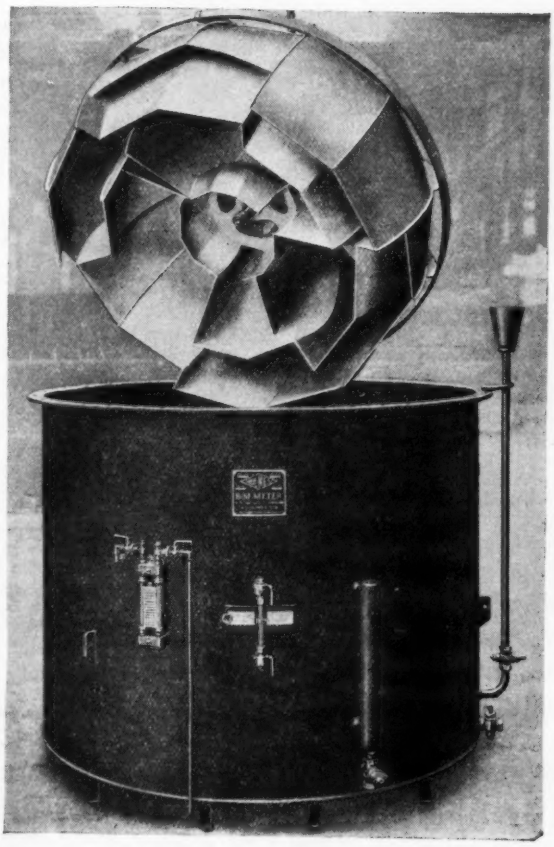
Specialists in the construction of Gasholders, Purifiers, Scrubbers, Condensers, Tanks, Etc. 35 Years' Experience. We are Contractors for all kinds of Gas Works Plant and Steelwork. Reconstruction — Repairs.

The IDEAL METER FOR THE INDUSTRIAL CONSUMER



A "B.M." GAS METER
to be used in connection with
GAS-FIRED BOILERS
at the New Civic Building, Leeds

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FOUNDED 1850
The Builders of
MODERN BY-PRODUCT PLANT
HOLMES-CONNERSVILLE METERS
EXHAUSTERS · BOOSTERS · BLOWERS

This meter is truly positive and conforms in every respect with the requirements of the Sales of Gas Act governing consumers' meters.

Standard sizes from 250 to 600,000 cu. ft. per hour . . .

These meters have been ordered for various purposes by:

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Swinton & Mexborough Gas Board.
Gas supply to rolling mill.

Stafford Corporation Gas Dept.
Gas supply to Engineering Works.

Dunfermline Corporation Gas Dept.
Gas supply to Admiralty Dockyard.

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For Calcutta.

Gt. Grimsby Gas Co.
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Newcastle-on-Tyne & Gateshead Gas Co.
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Telephone. Victoria 4505. Telegrams: Ignitor, Sowest, London.

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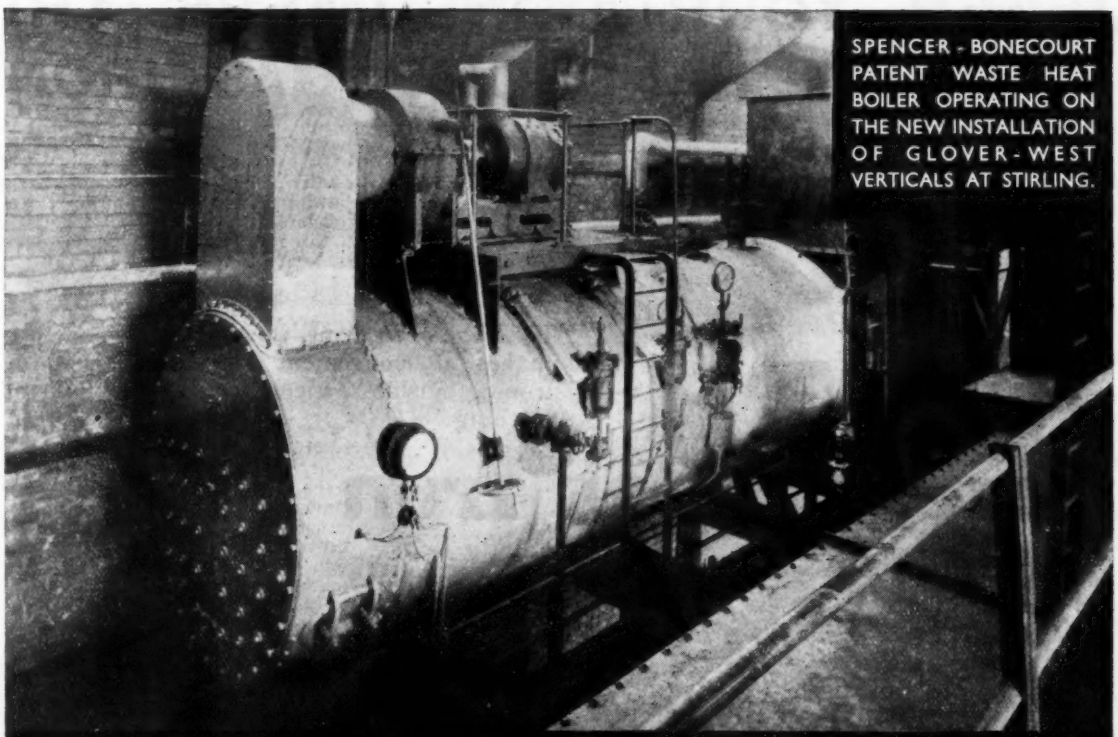

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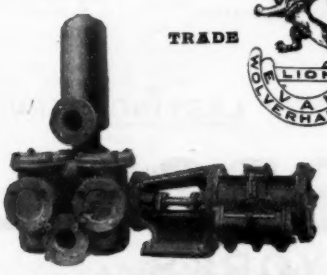

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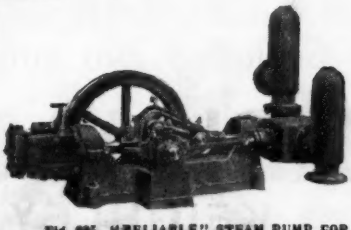
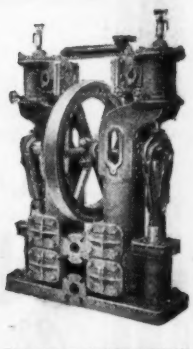


Fig. 685. "RELIABLE" STEAM PUMP FOR TAR AND THICK FLUIDS.



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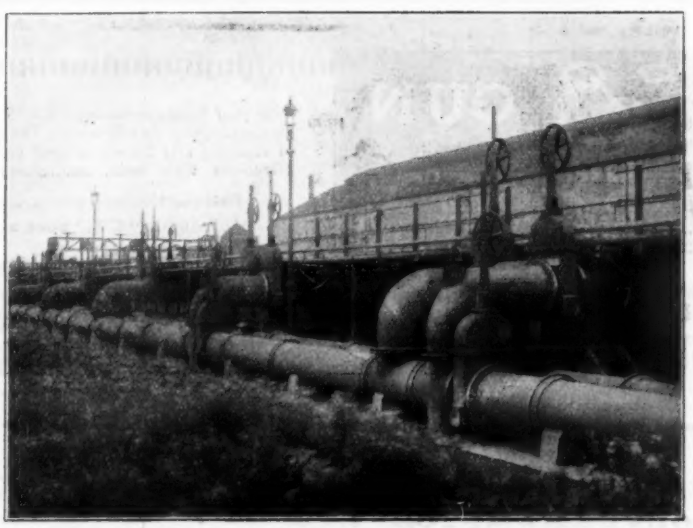

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